Report on the 2003/2004 Pittsfield Septage Pilot Study

Town of Pittsfield
Pittsfield, New Hampshire

2005

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In cooperation with:
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Gosse Septic Service
Resource Management Inc.

TEC

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EXECUTIVE SUMMARY

The Town of Pittsfield conducted a successful Septage Pilot Study in 2003-2004 drawing on a diversity of resources. Results of the Pittsfield Septage Pilot Study were positive, with minimal negative impacts observed to the lagoon process, and no observable negative impacts to the treatment plant effluent. Special recognition is due to Ron Vien and the wastewater department staff, and to Bill Gosse and the staff at Gosse Septic Service (GSS) for their tireless efforts and significant contributions to the success of the Pittsfield Septage Pilot Study.

The need for new septage disposal sites in New Hampshire will continue to grow as many private septage disposal facilities are shut down and continued pressure to develop rural land exists in the study area. Future growth in Pittsfield's Rural Zone will increase the need for additional septage treatment capacity at the Pittsfield Water Pollution Control Facility (WPCF). Pittsfield, geographically, is in a position to provide a relatively close septage outlet to the surrounding communities.

The process approach used for septage pre-treatment included manual screening of the raw septage, conditioning raw septage with lime, blending in ferric chloride and polymer, trapping the gross solids in a dewatering container, and treating only the liquid filtrate at the aerated lagoon facility. No degradation of effluent quality was measured due to septage processing during the two-year study.

The Pittsfield WPCF processed more than 1.3 million gallons of raw septage in 2003-2004 with the best plant performance observed when filtrate total phosphorous was less than 2mg/l. Results of the 2003/2004 Pittsfield Septage Pilot Study were favorable for developing a long-term expansion of Pittsfield's septage receiving facilities. All indications are that the facility could support as much as 3 MG per year with strict control on filtrate quality.

Several concepts were considered by TEC for developing a long-term septage receiving and residuals management operation at the Pittsfield WPCF. Building a successful septage operation is primarily a function of the capital costs for improvements, a Town's interest in developing a long-term public-private partnership, and identifying economical outlets for the septage residuals. The opportunity to enhance septage treatment at existing aerated lagoon wastewater facilities could provide treatment for another 5 to 10 MG of septage per year, or 6% to 11% of the State's total septage generation.

Lessons learned over the course of the two-year pilot study that will prove beneficial to other communities considering a septage expansion program include:

- Operating a temporary or permanent septage facility within the fence line of an existing aerated lagoon facility requires less than 1 acre of usable land.
- Implement the best screening and grit removal process that is affordable.
- Batch process raw septage with the chemicals to get more consistent filtrate quality.
- Vigorous mixing of ferric chloride with raw septage, followed by slow, short-duration mixing with polymer, yielded excellent coagulation and settling characteristics, producing a very clear filtrate.
- Phosphorous control when processing raw septage is absolutely necessary at wastewater lagoon facilities.
- Odors from the septage processing, thought to be a critical component of the pilot study, proved minimal.
- Removing septage solids and sending only filtrate to the headworks significantly reduces the waste load to the aerated lagoon system.
- Reduced strength filtrate allows for a higher volume of raw septage to be treated without significant changes to downstream processes.

1. INTRODUCTION

1.1 Project Planning Area

The Town of Pittsfield is located approximately 19 miles northeast of Concord, New Hampshire. Pittsfield has an established downtown and developed Main Street, yet is predominantly a rural community. Zoning districts within the Town include Urban (121 acres), Suburban (1883 acres), Rural (12,643 acres), Commercial (24 acres), and Light Industrial-Commercial (817 acres). The 2000 Census recorded a town-wide population of 3931 persons, primarily residing in Pittsfield's rural district. The New Hampshire Office of Energy and Planning indicates a 2025 projected population of 5400 persons, with much of this residential growth occurring within the rural district limits.

In the Town's 2000 Master Plan, the Planning Committee (Committee) indicated that the Rural Zoning district has the greatest potential for growth, comprising some 80% of the total land area in Town. Under current zoning rules, complete build-out of the Rural Zone could add as many as 5700 single-family units, although topographical, physical, and natural resource constraints will limit this number. Still the vast majority of these units would be built beyond the feasible limits of public water and sewer services, relying on on-site water supply and subsurface disposal systems. The NH DES Residual Management Section currently estimates that annual septage generation in Pittsfield approaches 207,000 gallons/year. Future growth in Pittsfield's Rural Zone will increase the need for additional septage treatment capacity at the Pittsfield WPCF.

The Committee also identified areas impacted by growth and development such as transportation, housing, schools, community services and facilities, recreation, natural and historic resources, land use, and economic development. Pittsfield plans to achieve balanced economic growth in Town by attracting a broad variety of business and industry to areas within reach of, or already having, water and sewer service in the Urban district, and portions of the Suburban district. Despite the utility services available in the Village and downtown area, the Committee no longer encourages industrial activity in the downtown area. The recent closure of Suncook Leathers Tannery has begun the desired transition of heavy industrial users out of the downtown, and should allow the Town to transition similar types of businesses to the Route 28 corridor.

The Town of Pittsfield shares its border with six other rural communities: Barnstead, Strafford, Northwood, Epsom, Chichester and Loudon. None of these six communities has a municipal wastewater facility serving their town. However, each of these communities has a need for septage disposal for their residents. Beyond these six towns and within a 20-mile radius of the center of Pittsfield, lie eight more rural communities: Alton, New Durham, Farmington, Barrington, Nottingham, Deerfield, Canterbury and Gilmanton. Of the 14 outlying communities, nine have formal inter-municipal agreements with a host community accepting their septage. The remaining communities are seeking agreements for long-term septage receiving for their residents. The planning area is considered to include Pittsfield and the surrounding 14 communities.

1.2 Existing Facilities

The Town's Water Pollution Control Facility (WPCF) was designed and constructed in the mid-1970's and began operating in 1978. The facility is located adjacent to the Suncook River on a 55-acre parcel of land, a little more than 1/2-mile south from the center of downtown Pittsfield. The WPCF operates as a secondary treatment, aerated lagoon process with chlorine disinfection. The WPCF discharges into the Suncook River, a Class B river, approximately 16 river-miles upstream from its confluence with the Merrimack River.

Approximately nine miles of sewer collection system, seven pump stations, and several thousand feet of force main convey raw wastewater to the facility. While the majority of the waste stream is domestic wastewater, a variety of commercial and retail businesses have operated in Pittsfield over the past 25 years. The only significant industrial discharge was from the Suncook Leathers Tannery (now closed for business).

The original WPCF design included a septage collection manhole with no screening, grit removal or flow attenuation. The collection manhole is centered over the influent pipe approximately 100-ft upstream from the headworks. In 2002, a new 4000-gallon holding tank with ¼-inch bar screen and variable speed mixers was installed for septage receiving and flow attenuation. The 4000-gallon tank discharges through a gravity sewer and is mixed with the influent waste stream approximately 200-ft upstream from the upgraded headworks.

The influent room of the operations building houses the headworks equipment. This equipment was upgraded in 2002 to add a microstrainer, new blowers, and grit screw, as well as ultrasonic flow measurement. The secondary process is a three cell aerated lagoon process, with seven floating mechanical aerators in service. Disinfection is achieved using flow-paced chlorine injection, chlorine contact, and then chemical dechlorination prior to discharge. Effluent flow is measured using an ultrasonic device.

Like many other rural New Hampshire communities with aerated lagoon facilities Pittsfield increased their septage receiving each year after start-up in 1978. The WPCF received septage from Pittsfield residents, as well as from a number of Southern New Hampshire communities. During this time, septage haulers dumped their loads directly into the collection manhole creating a shock load of anaerobic biomass into the primary lagoon. Repeated shock loads with no pretreatment or flow attenuation hindered the lagoon operation. Within six years of the WPCF coming on line, the primary lagoon was overloaded with solids, the aeration system failed, and a temporary moratorium was placed on septage receiving.

The aeration system was upgraded in 1992 and septage receiving was reinstated, but this time only from Town of Pittsfield residents. Since 1992 the annual average septage volume received and processed was approximately 110,000 gal/yr. During the spring of 2001, the Town implemented a sludge removal program at the facility. Approximately 460 dry tons of sludge was removed from the three-cell lagoon system at a cost of $300,000.00. The 2002 headworks upgrade along with installation of a floating baffle curtain in the primary lagoon was intended to improve primary treatment capabilities at the WPCF and reduce the overall solids load to the downstream cells. The Town is continuing with a study of secondary treatment and disinfection improvements at the WPCF to complete the improvements to the wastewater facility.

1.3 Need for Expanding Septage Receiving Capacity

The aerated lagoon treatment process does not typically respond well to traditional septage receiving methods where solids, grit, inorganic debris, and high strength waste are discharged directly into the primary treatment lagoon. In Pittsfield’s case, repeated slugs of anaerobic material occasionally overloaded the grit chamber and subsequently shocked the primary lagoon. Unscreened septage discharged into the primary lagoon led to rapid accumulation of solids over the aeration tubing, causing the original aeration system to fail. For Pittsfield to handle their own annual septage volume, solids passed through to the primary lagoon must be limited to reduce sludge accumulation, and would also include the added expense of more frequent sludge removal cycles from the lagoons. Clearly, another method of septage receiving is needed to accommodate Pittsfield and the surrounding communities.

Pittsfield and the 14 towns that comprise the planning area are almost solely dependent on individual subsurface disposal systems to treat their domestic wastestream. The NH DES Residuals Management Section reports annual septage volumes (combined) for the 15 communities to be in the range of 4,000,000 gallons/year. The project planning area was identified by the NH DES as an area in Southern New Hampshire that needed a reliable, long-term septage treatment and disposal solution. Statewide there is a need for adding in-state septage receiving sites to offset the disposal of some 90 million gallons per year, 26% of which currently is disposed of out-of-state. With some private facilities shut down for non-compliance with their groundwater discharge permits and continued pressure to develop rural land, the need for new disposal sites will only grow.

Unlike Pittsfield, the 14 surrounding towns do not have a municipal wastewater facility operating in their community. As such they are faced with higher septage disposal costs than Pittsfield. Septage haulers working in these communities must use treatment and disposal sites ranging from private septage lagoons to municipal wastewater facilities in Concord, NH, Franklin, NH, and South Berwick, ME. Adding to the burden that septage haulers face is the fact that several of the privately owned and operated septage lagoons have been closed due to groundwater contamination at these sites. Long hauling distances to approved treatment and disposal sites directly impacts the septage haulers serving these communities by reducing the number of customers served per day, increasing fuel consumption, increasing wear on the septage trucks, and impacting the haulers competitiveness by virtue of incurring higher operating costs.

Geographically, Pittsfield is in a position to provide a relatively close septage outlet to the surrounding communities. However, the treatment facility, designed and built in the late 1970's, was never designed with large-scale septage receiving in mind. The Town of Pittsfield Board of Selectmen, realizing the needs of Pittsfield residents as well as those of the surrounding communities, was pro-active in initiating the Septage Pilot Study. The Selectmen's goal of investigating the feasibility of expanding septage receiving capacity at the facility, while still considering options for upgrades to the secondary treatment process, was prudent and timely. Results of the Septage Pilot Study were favorable for developing a long-term expansion of the septage receiving facilities. Pittsfield can become a role model for similar sized communities with existing wastewater infrastructure in New Hampshire to expand their capacity; becoming part of a statewide solution to the impending septage crisis.

2. PITTSFIELD SEPTAGE PILOT STUDY

2.1 Pilot Study Development

During the fall of 2002, members of the NH DES Wastewater Engineering Bureau (WWEB) inquired about Pittsfield's potential role in providing an area-wide septage solution. The incentives to Pittsfield included additional grant funding eligibility for committing to improve septage receiving. On December 23, 2002, TTG Environmental Consultants, LLC (TEC) facilitated a meeting held at the Pittsfield Town Office to introduce the concept of developing a pilot study to make further improvements to the septage receiving and processing capabilities at the wastewater facility. In attendance were the Town Manager, the Wastewater Superintendent, two staff members from the NH DES WWEB, a representative from Resource Management Incorporated (RMI) and a representative from TTG Environmental Consultants (TEC). An open discussion ensued about the statewide septage problems, the potential for existing wastewater facilities to assist rural communities with long-term septage disposal, and the dilemma facing the reputable septage haulers in New Hampshire.

After the meeting, attendees visited the Pittsfield WPCF site and the adjoining land owned by the Town. A consensus was reached to develop a conceptual plan for a pilot study. If results of the pilot study were positive, an enhanced septage receiving facility might be constructed at the same time as the planned secondary process improvements. The DES Residuals Management staff indicated that Pittsfield's investment in constructing an enhanced septage receiving and septage solids process could be eligible for additional grant funding through the State Aid Grant Program.

2.1.1 Overall Goals of the Pilot Study

The pilot team met several times after the December 2002 meeting and developed a set of goals for the pilot study that considered the variable interests of stakeholders. The overall goals were to:

1. Collect data on filtrate, plant influent and effluent quality, to determine the effects of septage filtrate on the aerated lagoon treatment process. This data is to be made available to other wastewater treatment lagoon facilities in New Hampshire.
2. Measure septage solids volumes for a complete septage-hauling season.
3. Assess the "pros" and "cons" of operating an expanded septage receiving and septage solids recycling operation from a municipal wastewater lagoon facility.
4. Define the limits of operating a financially successful septage receiving and processing station at the Pittsfield WPCF.
5. Assess the potential for developing a long-term public-private partnership with a local septage hauler.

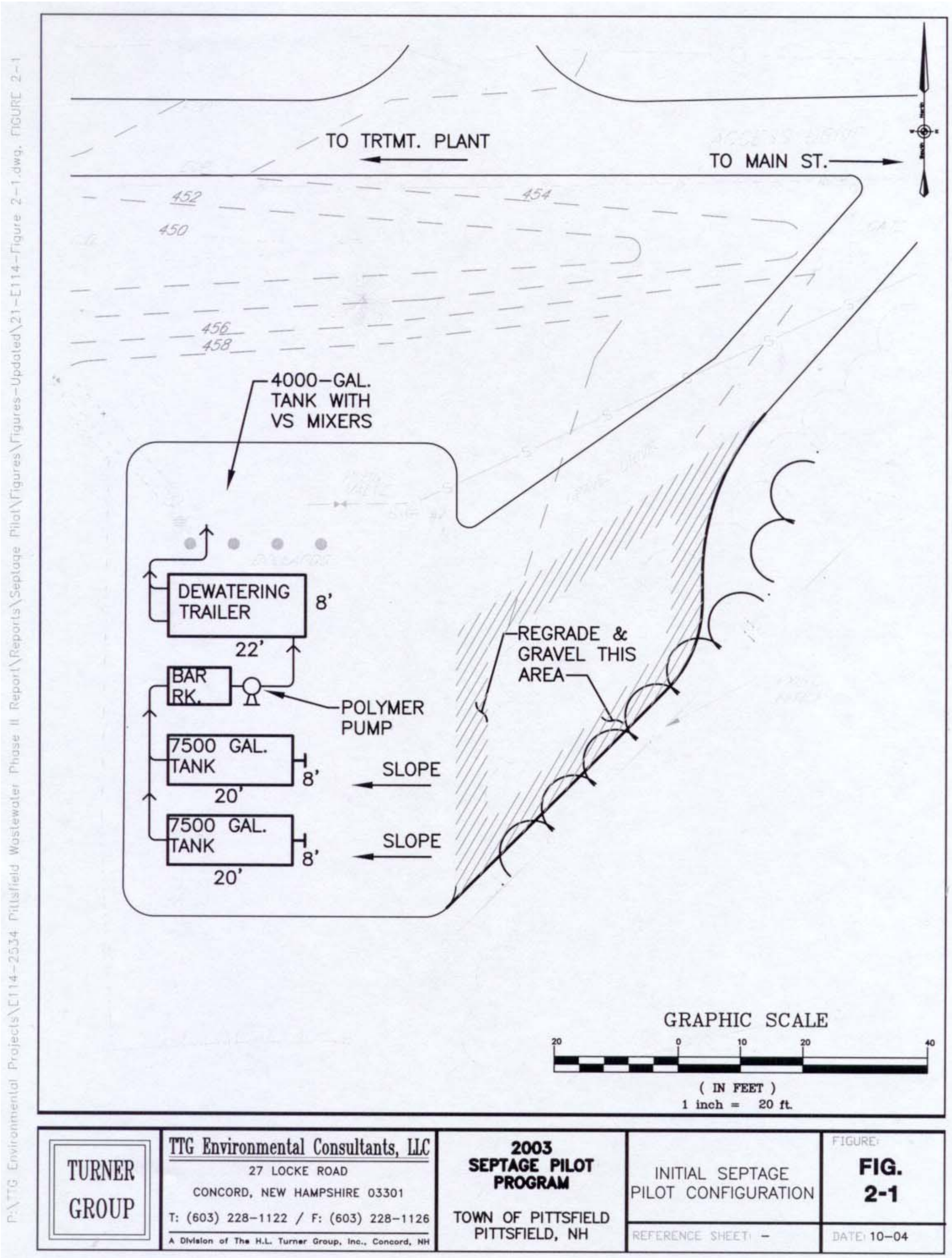
In addition to these broad goals, each of the stakeholders had specific interests that, while not contradictory, led to a wide range of considerations in developing a mutually agreeable approach to septage receiving, pre-treatment, filtrate disposal, and residuals management.

2.1.2 Public-Private Partnership

Pittsfield's Wastewater Superintendent, Mr. Ron Vien, noted that two local septage haulers with private septage lagoons operating in Pittsfield were under increasing pressure to cease additional dumping in their septage lagoons due to potential groundwater contamination. Ron contacted Mr. Bill Gosse, Owner of Gosse Septic Service (GSS), for his input as a local hauler who occasionally used the Pittsfield WPCF in the past. In 2002, GSS acquired a dewatering container as part of their septage treatment operation. By trapping the solids, GSS was able to discharge only the watery filtrate into their septage lagoons. GSS stockpiled septage solids on-site for later disposal. Faced with closing down their private septage lagoon facility, GSS was eager to collaborate with the Pittsfield WPCF on the pilot study.

With GSS on board, the project team quickly developed a conceptual process design that incorporated off-loading the septage to a holding tank, followed by coarse screening, then chemical addition (for flocculation and phosphorous reduction) and finally pumping to the GSS dewatering container. The "DeTainer", as trademarked by Green Mountain Technologies, would trap septage solids and pass filtrate to the 4000-gallon holding tank prior to blending with the plant influent. Figure 2-1 is a schematic level plan depicting the initial septage handling process used at the start of the Pilot Study.

With the liquid process scheme fully developed, a plan to handle the captured septage solids had to be finalized. RMI, one of the initial collaborators in developing the pilot study, was interested in developing new residuals-based products and launching these efforts from new locations in New Hampshire. RMI, operating from Ashland, New Hampshire, brought ten years of knowledge and experience with residuals management projects to the pilot study. RMI developed a soil amendment plan that involved mixing the septage solids on-site with short-paper fiber, wood ash, and sand. The soil amendment product would then be spread on the outer embankments of the treatment lagoons as topsoil and seeded. Figure 2-2 shows the septage residuals process and its location inside the WPCF fence.


TO TRTMT. PLANT
TO MAIN ST.
4000-GAL. TANK WITH VS MIXERS
DEWATERING TRAILER
8'
22'
BAR RK.
POLYMER PUMP
7500 GAL. TANK
8'
20'
SLOPE
7500 GAL. TANK
8'
20'
SLOPE
REGRADE & GRAVEL THIS AREA
GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.
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2003 SEPTAGE PILOT PROGRAM
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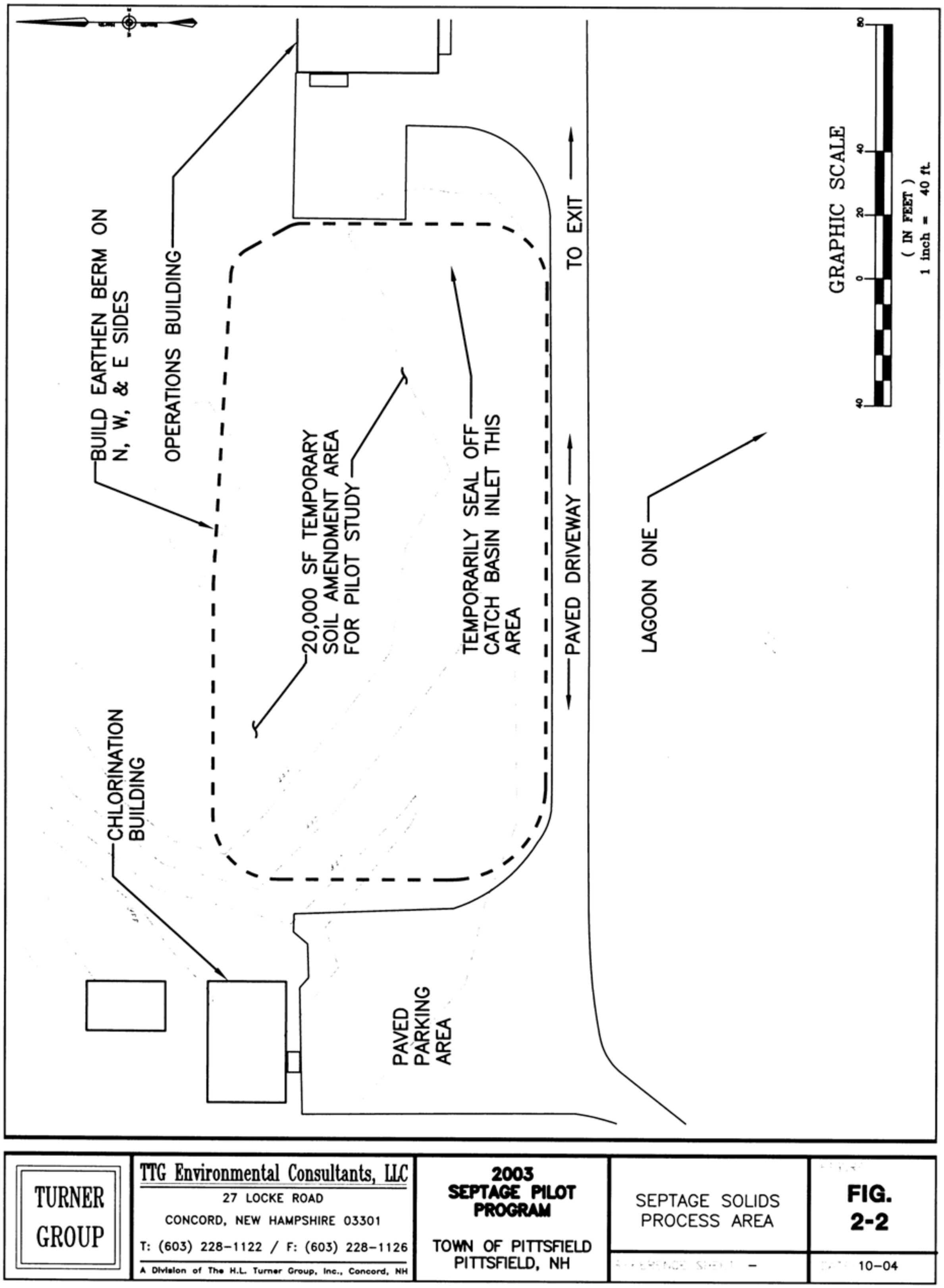
INITIAL SEPTAGE PILOT CONFIGURATION
FIGURE
FIG. 2-1
REFERENCE SHEET: -
DATE: 10-04


BUILD EARTHEN BERM ON N, W, & E SIDES
OPERATIONS BUILDING
20,000 SF TEMPORARY SOIL AMENDMENT AREA FOR PILOT STUDY
TEMPORARILY SEAL OFF CATCH BASIN INLET THIS AREA
TO EXIT
PAVED DRIVEWAY
LAGOON ONE
GRAPHIC SCALE
40
0
20
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80
(IN FEET)
1 inch = 40 ft.
CHLORINATION BUILDING
PAVED PARKING AREA
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TOWN OF PITTSFIELD
PITTSFIELD, NH
SEPTAGE SOLIDS PROCESS AREA
FIG. 2-2
10-04

The Town of Pittsfield, having purchased a 90-acre parcel of land adjacent to the wastewater facility in 2001, agreed to reserve a portion of this land for future WPCF expansion. Several options are being considered for the parcel including: investigating a groundwater discharge for treatment plant effluent, developing a regional septage solids recycling or compost operation on the site, dedicating the site solely to Pittsfield's septage solids processing, stockpiling and disposal, or reclaiming the existing gravel pit on the site using septage solids generated from the septage receiving. The site is large enough to support a septage solids management operation that could also provide a periodic disposal site for lagoon sludge to be removed more frequently in the future. Ultimate disposal could be in the form of a compost or soil amendment product.

2.1.3 Limitations and Restrictions to Septage Receiving

Certain restrictions were placed on septage receiving during the Pilot Study. The team members agreed to a number of limitations; however the most important were related to the source of septage, the haulers involved, the fate of the septage residuals, and the total volume of septage processed. The Pilot Team agreed to the GSS proposal to limit the haulers to GSS and B&S Septic Service of Pittsfield, NH. B&S Septic was further restricted to dumping only Pittsfield's septage. This was done to keep from overwhelming GSS at the temporary septage receiving station. The source of septage was limited to domestic origin with absolutely no grease or restaurant waste allowed. Residuals were to be managed on-site with their ultimate disposal to be on the treatment lagoon side slopes, all within the fence line of the WPCF. Lastly, the NH DES limited the pilot study to a maximum volume of 1,000,000 gallons, almost ten times the septage that Pittsfield's WPCF had treated in an average year.

2.2 Pilot Process Approach

Septage treatment is a challenge for wastewater facilities, particularly in New Hampshire, where many small municipally owned facilities serving rural communities are inadequately designed to treat septage. Comparatively, septage strength can be 10 to 50 times greater than an equivalent volume of domestic wastewater. Table 2-2 compares suggested EPA design values for raw septage to the septage filtrate strength treated by the Pittsfield WPCF. In almost all cases, filtrate strength was considerably less than raw septage strength. Also, by removing solids prior to the secondary process, Pittsfield avoided rapid solids buildup with the potential to create a nutrient sink in the primary treatment lagoon. Despite solids captured at the front-end of the process, septage is difficult to characterize due to its variable nature.

Table 2-2 Comparison of Septage Strength Design Values to Average Septage Filtrate Strength					***TEC-05***
	Source of Data: (WEF-1998/EPA-1984)		**Source of Data: Pittsfield Pilot Study**		
Parameter	**Raw Septage (mg/l)**	**Raw Wastewater (mg/l)**	**Raw Wastewater (mg/l)**	**Septage Filtrate (mg/l)**	
TSS	15000	220	219	117	
Range			(192 to 333)	(33 to 326)	
BOD	7000	220	----	----	
CBOD	----	----	226	549	
Range			(146 to 294)	(198 to 928)	
COD	15000	500	280	700	
Range			(50 to 500)	(400 to 1200)	
TKN	700	40	44	108	
Range			(26 to 57)	(85 to 140)	
NH3-N	150	25	30	85	
Range			(16 to 39)	(71 to 98))	
Total Phosphorous	250	8	4.5	2.8	
Range			(3.3 to 6.0)	(0.2 to 12)	
pH	1.5 to 12.6	----	6.0 to 8.5	5.0 to 9.0	
Range					

With a non-uniform generation rate and extreme variability in composition due to frequency of tank pump out, use of garbage grinders, drinking water characteristics, and personal habits of the occupant's, septage can overload traditional biological treatment processes. Understanding how septage is typically processed at a wastewater facility is important to realizing the value of the Pittsfield Pilot Process.

2.2.1 Traditional Septage Management in New Hampshire

Traditional septage management techniques employ one of three methods of handling raw septage. These are land treatment/disposal, co-treatment with other waste, or independent treatment. The Pittsfield Septage Pilot Study incorporates aspects of all three of these traditional methods in an attempt to maximize septage receiving at a relatively small, rural wastewater facility.

Land treatment/disposal as practiced in New Hampshire typically incorporates trenches or lagoons to assist with drying the septage, followed by some form of land spreading, incorporation or stockpiling the septage solids. For decades, many municipalities and independent septage haulers in New Hampshire owned and operated unlined septage lagoons as the predominant disposal option in the State. Over the past 10 years, these unlined lagoons have had to obtain a groundwater permit, install monitoring wells, establish a groundwater discharge zone, and subsequently obtain a septage facility permit in accordance with the State's Septage Management Rules, Env-Ws 1600. During this period, many of these land facilities have been found to cause elevated nitrate levels in the groundwater, or have been unable to meet boundary set-back requirements established in the regulations. To protect public health and the environment, the NH DES has been working with all non-compliant facilities to clean up their lagoon sites or to cease operation. As a result, approximately 75% of these unlined lagoon facilities have closed.

Co-treatment of septage is most common in NH and is practiced at many of the largest activated sludge wastewater facilities in the State. Traditional methods include some form of coarse screening of the septage as part of off-loading into holding tanks. Septage may then be bled into the treatment plant influent or may be combined with primary and secondary sludge streams prior to mechanical dewatering. Limitations at the wastewater facilities for this method usually involve limited septage holding tank capacity, limited treatment process capacity, or limited dewatering capacity.

Independent treatment involves building a dedicated septage treatment facility that provides screening, storage, biological or chemical reduction, dewatering, disinfection, and disposal of the liquid stream. A comprehensive residuals management program must also be part of the treatment plan. New Hampshire does not currently have a dedicated septage-only treatment facility as the cost to site, permit, construct, operate and manage a dedicated facility has yet to be proven economically viable.

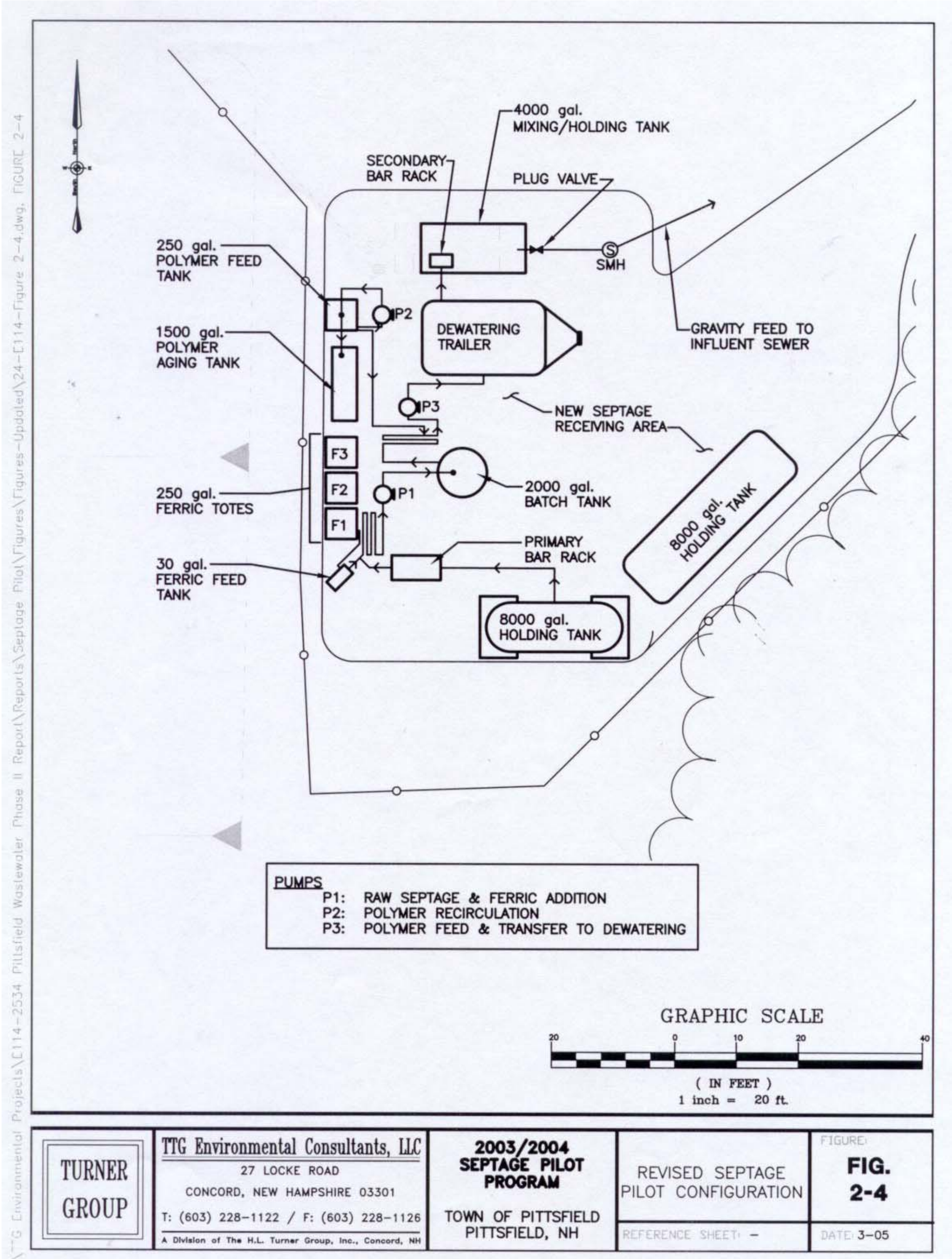
Septage receiving, treatment, and disposal in New Hampshire is accomplished using a variety of methods including: land treatment and disposal by independent septage haulers, transporting septage for treatment across the border's of Vermont, Massachusetts and Maine, and treatment at municipal wastewater facilities; primarily activated sludge plants. The NH DES Residuals Management Section reports that in 2004 the fate of NH septage is apportioned as roughly 24% to out-of-state facilities, 10% to septage lagoons, almost 15% to land treatment and innovative systems, with the remaining 51% to in-state wastewater facilities.

New Hampshire's wastewater infrastructure includes approximately 75 publicly owned treatment works (POTW) with a total design flow of 160 million gallons per day (MGD) to treat domestic, commercial, and industrial wastewater. New Hampshire's municipally owned and operated aerated lagoon facilities (25 altogether), have a total design flow of 20 MG or 12.5% of the State's design capacity. However, the aerated lagoon facilities contribute far less to septage treatment. Of the 42 MG of septage treated at NH POTW's in 2004, less than 1 MG, or 2% of the septage was treated at 13 aerated lagoon facilities. The opportunity to enhance septage treatment at existing aerated lagoon POTW's could provide treatment for another 5 to 10 MG of septage per year, or 6 to 11% of the State's current annual septage generation.

2.2.2 Process Approach for Pittsfield

A combination of the three traditional septage management practices was developed for Pittsfield. The pilot team provided input to TEC that proved invaluable in developing a concept that would work as a pilot-scale facility. The Pittsfield WPCF offered insight into past septage hauler practices at the WPCF and designated an area on-site for collecting and blending the septage solids. The NHDES Wastewater Operations Section provided guidance on nutrient management and assisted with bench testing chemicals for nutrient reduction and better coagulation of solids. The NH DES Residuals Management Section provided guidance on solids handling, stabilization, and testing requirements. GSS provided insight into storage tank volumes required for rapid septage hauler turnaround, recent experience with polymer addition to raw septage, and staging of the dewatering trailer. RMI offered their experience with developing a soil amendment program to reuse the septage solids on the lagoon embankments as loam and seed cover.

The process approach developed for the pilot study included: septage screening, septage holding, chemical pre-treatment, batch processing, polymer addition, separation of septage solids from the waste stream, co-treatment of the filtrate with wastewater influent, and land application of the residuals. Figure 2-4 is a schematic plan of the revised septage receiving approach developed mid-way through the 2003 Pilot Study. Coarse screening was necessary to protect the pumps and downstream components. Chemical additions were necessary for nutrient reduction and solids coagulation. Batch processing in 2000-gallon volumes was used to better regulate the chemical additions and more closely monitor filtrate quality. Solids separation in the "DeTainer" occurred over time as the filtrate drained into the new holding tank. Solids were emptied from the "DeTainer" periodically to a bermed area, and covered with wood ash after sampling. Figure 2-5 is a schematic plan of the soil amendment application area.



4000 gal. MIXING/HOLDING TANK
SECONDARY BAR RACK
PLUG VALVE
SMH
250 gal. POLYMER FEED TANK
P2
1500 gal. POLYMER AGING TANK
DEWATERING TRAILER
GRAVITY FEED TO INFLUENT SEWER
P3
NEW SEPTAGE RECEIVING AREA
F3
F2
F1
P1
250 gal. FERRIC TOTES
2000 gal. BATCH TANK
8000 gal. HOLDING TANK
PRIMARY BAR RACK
30 gal. FERRIC FEED TANK
8000 gal. HOLDING TANK
PUMPS
P1: RAW SEPTAGE & FERRIC ADDITION
P2: POLYMER RECIRCULATION
P3: POLYMER FEED & TRANSFER TO DEWATERING
GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1 inch = 20 ft.
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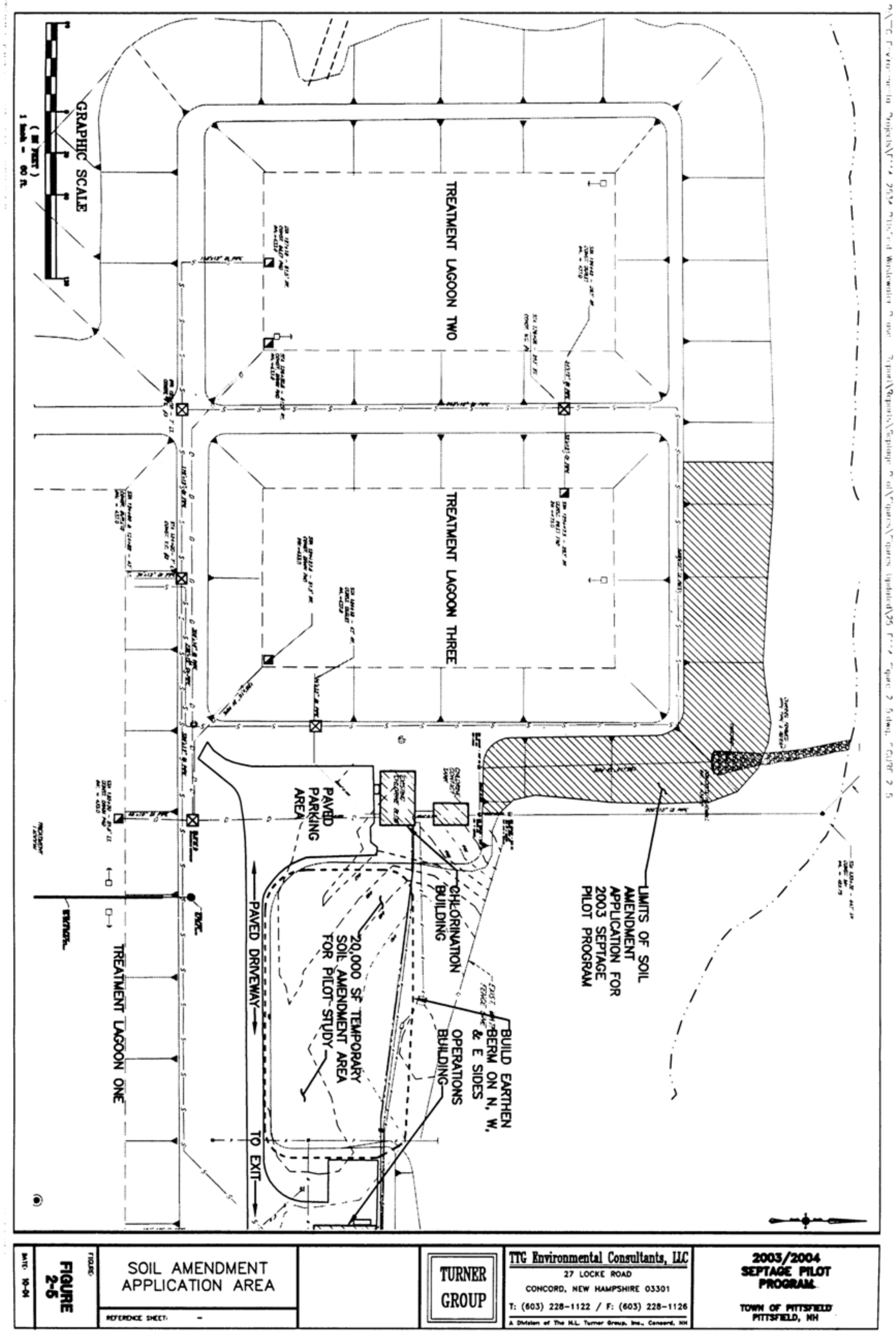
TOWN OF PITTSFIELD
PITTSFIELD, NH
REVISED SEPTAGE PILOT CONFIGURATION
REFERENCE SHEET: –
FIGURE:
FIG. 2-4
DATE: 3-05


GRAPHIC SCALE
(IN FEET)
1 inch = 60 ft.
TREATMENT LAGOON TWO
TREATMENT LAGOON THREE
TREATMENT LAGOON ONE
PAVED PARKING AREA
PAVED DRIVEWAY
TO EXIT
CHLORINATION BUILDING
OPERATIONS BUILDING
20,000 SF TEMPORARY SOIL AMENDMENT AREA FOR PILOT STUDY
BUILD EARTHEN BERM ON N, W, & E SIDES
LIMITS OF SOIL AMENDMENT APPLICATION FOR 2003 SEPTAGE PILOT PROGRAM
SOIL AMENDMENT APPLICATION AREA
FIGURE 2-5
DATE: 10-04
REFERENCE SHEET: -
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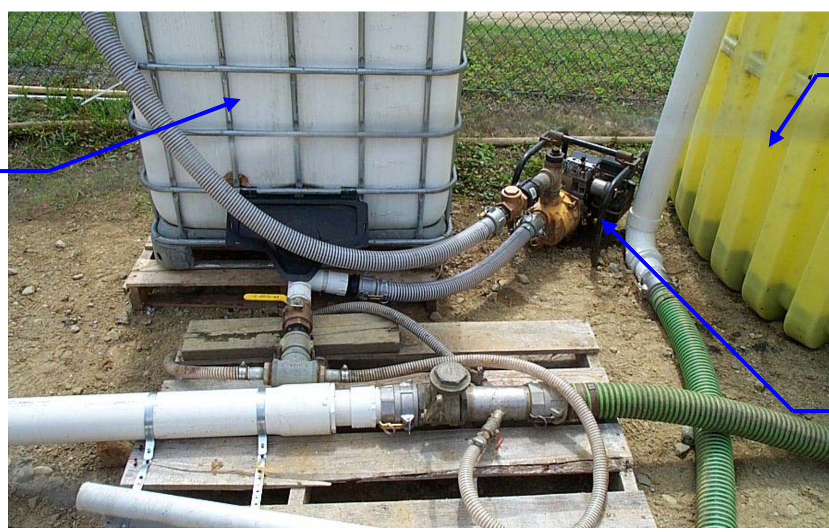
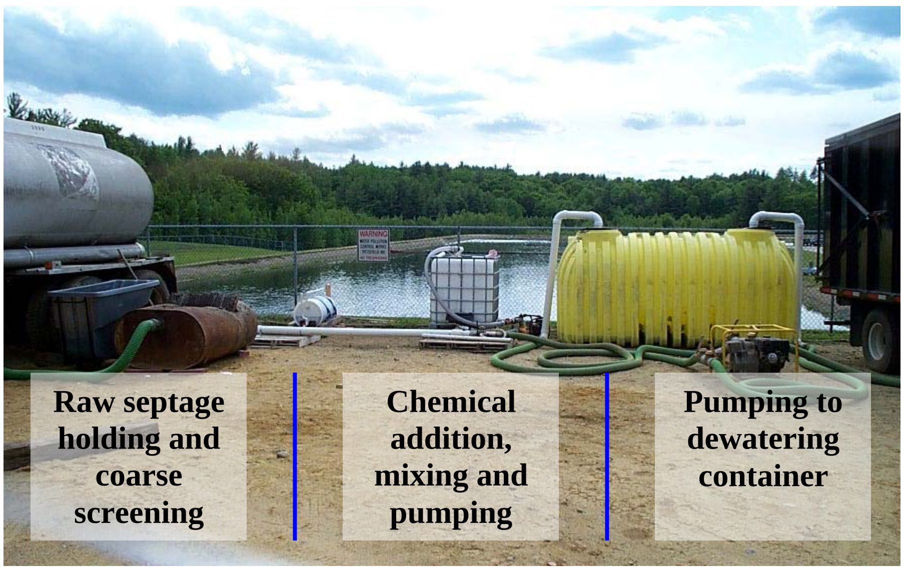
To the extent possible, the pilot team decided to use “portable” equipment to avoid having the Town of Pittsfield expend funds on permanent, fixed equipment, if the pilot project was not successful. GSS provided almost all of the equipment as part of a tipping fee waiver agreement with the Town. GSS delivered and set-up two 8000-gallon tanker trailers that were used as holding tanks. GSS also provided transfer pipe and hoses, a coarse bar rack, a polymer blend tank, a mixing pump, a transfer pump, a ferric chloride feed tank, and the dewatering trailer. The Town of Pittsfield supplied the 2000-gallon batch tank, two transfer pumps and miscellaneous pipe, hoses and fittings.

The ferric chloride solution, purchased by the Wastewater Department, was shipped to the WPCF in 250-gallon tote containers. GSS purchased polymer in dry form and mixed it in batches as needed. The mixing and transfer pumps were portable pumps driven by gasoline engines. The ferric chloride feed pump was a portable electric pump powered from the electrical feed for the variable speed mixers at the 4000-gallon holding tank.



Another reason for using portable equipment was to evaluate its effectiveness versus traditional fixed equipment arrangements. Using low-cost, portable equipment could be one means to develop septage receiving at wastewater lagoon facilities in areas with short hauling seasons, relatively low demand, or severe budget restrictions. The land area required to accommodate this temporary equipment was relatively small, at less than 10,000 square feet, or roughly ¼-acre (not including setbacks).



Siting this operation at an existing wastewater facility, particularly a lagoon facility, requires little alteration on-site. Most lagoon facilities serve rural communities and have the benefit of a moderate to substantial buffer zone to adjoining private properties and dwellings. Incorporating a temporary or permanent septage facility within the fence line of an existing aerated lagoon facility could be readily accomplished in most cases. Incorporation with an existing facility compares favorably to siting a private, stand-alone septage receiving facility, which requires more than 10-acres of buffer zone per the latest sludge and septage facility permit regulations. The land cost, site permitting, local planning, and zoning processes can be costly and time consuming to a private entity planning to site a dedicated septage treatment facility.

2.3 Operation of the Pilot Receiving Station

2.3.1 General Operations

Ron Vien and the staff at the Pittsfield WPCF teamed with the staff of GSS to handle the day-to-day septage receiving, batch processing, and solids management operations. GSS septage hauling trucks delivered loads ranging from 2000 gallons to 4000 gallons for off-loading to the storage tankers. Off-loading was observed to take from 5 to 15 minutes depending on the volume being dumped, the need to reconfigure hoses, or the need to add lime to raise the pH of the septage while pumping out of the haul truck. The 8000-gallon tankers allowed for several loads of raw septage to be delivered to the WPCF prior to processing septage through the pilot treatment system.

GSS processed septage through the pilot system by manually opening the tanker drain valve and gravity feeding septage into the makeshift bar rack. At the same time, GSS would activate the ferric and polymer feed systems. Initially the septage was pumped through a circuitous header pipe system with the chemicals added at different points in the header pipe. This system was later replaced with a 2000-gallon batch tank for better process control. Discharge from the header pipe went directly into the "DeTainer" dewatering trailer. On average, 60 minutes was needed to off-load a tanker, process a batch, and allow the dewatering trailer to drain prior to loading with more septage. In most cases, GSS allowed several hours between processing batches and overnight draining from the dewatering trailer before dumping a load of solids in the holding area.

GMT
Dewatering
Trailer

Dumping a load of solids from the trailer to the stockpile area took from 45 minutes to 90 minutes. Preparations for dumping solids involved closing the feed and drain valves, disconnecting and moving all hoses to and from the dewatering trailer, closing and sealing the roof of the trailer, and connecting the trailer to a dump truck. Once connected, the loaded trailer was hauled to the temporary stockpile area and dumped on a bed of wood ash. The trailer was allowed to drain for up to 10 minutes. The freshly dumped solids were then covered with a layer of wood ash for odor and vector control.

2.3.2 Troubleshooting

The first three to four weeks of the pilot study (mid-May to mid-June) was spent configuring and reconfiguring the equipment, as the weekly volume of septage delivered to the site steadily increased. GSS was processing the septage solids in varying quantities using polymer addition to enhance coagulation of solids in the dewatering trailer. The wastewater staff and GSS routinely observed filtrate clarity leaving the dewatering trailer. The WPCF staff also collected filtrate samples on a pre-determined schedule for off-site analysis, and more frequently for in-house analysis of CBOD, TSS, and phosphorous. GSS would dump a load of solids when the "DeTainer" dewatering trailer was approximately half full or when the filtrate quality visibly diminished from clear to cloudy, or when gross solids were observed in the filtrate.

In mid-June the NH DES Wastewater Operations Section coordinated with a chemical supplier to have on-site bench scale testing done, blending ferric chloride with the raw septage, followed by polymer addition. The bench scale tests were impressive, indicating that both chemicals could be used successfully to enhance solids settling and solids captured within the dewatering trailer. The ferric chloride also provided phosphorous control and odor control, two primary concerns with processing septage at any wastewater facility. When processing septage at lagoon facilities, phosphorous control is absolutely necessary, since the solids load normally held in the lagoons over time releases phosphorous and other nutrients that algae will thrive on. In the past, significant algal blooms at the Pittsfield WPCF led to TSS violations of their NPDES discharge permit.

Odors from the septage processing, thought to be a critical component of the Pilot Study, proved to be minimal in nature. TEC maintains the opinion that minimal odors were present due to the restrictions of accepting only domestic (residential) septage, the limited volume of septage (< 5000 gal/day) received, the short holding times for raw septage, the blending of ferric chloride with raw septage, and the application of wood ash on the septage residuals. Tables 2-3 and 2-4 are a summary of total septage processed during the 2003/2004 Pilot Study. Attention to odors and potential off-site impacts must be considered during design of a permanent septage receiving station.

Table 2-3 Total Septage Processed in 2003 (by Town)

(Source: 2003 Pittsfield Septage Pilot Study; data provided by GSS)

TEC-05

	(1) Town Name	(2) Septage by Town	(3) Weekly Average	(4) Percent of Total Recvd.	(5) Percent of Town's Vol.
1	***Alton***	39,850	1,594	***7%***	11%
2	***Barnstead***	209,100	8,364	***35%***	73%
3	*Chichester*	22,825	913	***4%***	14%
4	***Epsom***	50,650	2,026	***8%***	16%
5	***Gilmanton***	60,500	2,420	***10%***	26%
6	*Northwood*	36,200	1,448	***6%***	13%
7	**Pittsfield**	54,100	2,164	***9%***	26%
8	***Strafford***	81,550	3,262	***14%***	32%
9	12 Other Towns	44,125	1,765	***7%***	- -
	Totals:	**598,900** (gallons)	**23,956** (gallons)		

	Table 2-4 Total Septage Processed in 2004 (by Town)				
	(Source: 2004 Pittsfield Septage Pilot Study; data provided by GSS)				
					TEC-05
	(1)	(2)	(3)	(4)	(5)
	Town Name	**Septage by Town**	**Weekly Average**	**Percent of Total Recvd.**	**Percent of Town's Vol.**
1	***Alton***	219,150	8,766	***28%***	60%
2	***Barnstead***	228,700	9,148	***29%***	80%
3	*Barrington*	3,000	120	***0%***	2%
4	***Epsom***	46,500	1,860	***6%***	15%
5	***Gilmanton***	51,400	2,056	***7%***	22%
7	**Pittsfield**	59,300	2,372	***8%***	29%
8	***Strafford***	56,750	2,270	***7%***	22%
9	Other Towns	119,625	4,785	***15%***	- -
	Totals:	**784,425** (gallons)	**31,377** (gallons)		

Based on the bench scale tests, TEC ordered 1000-gallons of ferric chloride for delivery to the WPCF. The chemicals were delivered to the site in July and the process was modified to accommodate ferric addition. From mid-July to mid-August, GSS experienced difficulty achieving a clear filtrate from the “DeTainer”. Trace amounts of unused ferric chloride appeared in the filtrate (tinted rust color) and in the septage solids dumped in the holding area (rust colored liquid separating from the solids). These symptoms spoke to a combination of inadequate mixing, insufficient mixing time and higher than desirable feed rates to the “DeTainer” dewatering trailer.

A pilot team meeting was held at the NH DES office in August, and the decision was made to modify the process to incorporate a 2000-gallon batch tank to improve chemical mixing. Converting to batch processing allowed GSS to more accurately quantify and control the chemical usage per 1000-gallons of raw septage processed. The end result was a much cleaner filtrate with a noticeable improvement in solids coagulation. GSS periodically added lime to the raw septage when the pH was less than 6.0 prior to any chemical addition. GSS also slowed the transfer pump from the batch tank to the dewatering trailer. Finally, GSS repaired several sections of the filter panels in the “DeTainer” dewatering trailer that were allowing gross solids to pass though into the filtrate. These adjustments significantly improved the septage processing and filtrate quality. The system was now able to produce a clear filtrate with measured total phosphorous concentrations consistently less than 2.0 mg/l. Table 2-5 is a summary of the filtrate total phosphorous measurements throughout the pilot study.

Table 2-5 Filtrate Total Phosphorous

TEC-05

Average Total Phosphorous Concentrations*

(Source: 2003-2004Pittsfield Septage Pilot Study)

Month 2003 2004	Septage mg/l	Filtrate pounds	Plant mg/l	Influent pounds	Plant mg/l	Effluent pounds
May-03	--	--	3.3	7.0	1.3	3.0
May-04	1.8	2.0				
Jun-03	12	0.2	4.0	8.0	1.4	2.5
Jun-04	2.5	2.2				
Jul-03	0.4	<0.1	6.0	7.0	1.4	2.0
Jul-04	2.8	2.7				
Aug-03	3.4	<0.1	4.4	8.0	1.0	1.5
Aug-04	2.8	3.5				
Sep-03	0.4	<0.1	5.8	11	0.7	1.0
Sep-04	1.3	1.5				
Oct-03	0.3	<0.1	4.1	7.0	0.7	1.0
Oct-04	1.8	1.9				
Nov**2003	0.2	<0.1	4.0	8.0	1.0	1.0
Nov**2004						

* Data based on one to four grab samples per month

** Only one day of data in November - shut down due to freezing weather

Removing the septage solids and sending only filtrate to the headworks significantly reduced the waste load to the aerated lagoon system. The pilot study data indicates that nutrient and solids loading in the filtrate ranged from 45% to 95% less than the raw septage values, as indicated in the literature (EPA, 1984 Guidelines).

One remarkable set of values to watch as the program goes forward is the COD data from the two-year study. The average COD concentration of the septage filtrate for the study approached 700 mg/l. The EPA 1984 Septage Guidelines indicates a conservative raw septage COD concentration of 15,000 mg/l with that of raw wastewater approaching 500 mg/l. The pilot data average COD concentration of 700 mg/l is 1.4 times the level suggested by the EPA and is 2.5 times the average COD concentration of 280 mg/l for raw wastewater entering the facility. One explanation may be the chemical addition processes (ferric chloride and polymer). Future septage processing at the Pittsfield WPCF will require careful metering and measurement of chemical additives, as well as monitoring the long-term impacts, if any, to downstream processes.

In summary, reduced strength filtrate allows for greater volumes of raw septage to be treated without significant changes to downstream processes. The “rule of thumb” for aerated lagoons has been to restrict septage-receiving volume to no more than 1% of the average daily flow. In Pittsfield’s case, that would mean processing no more than 2200 gallons per day of septage. Throughout the Pilot Study, septage processing routinely averaged more than 5000 gpd, peaking at more than 20,000 gpd.

3. WASTEWATER LAGOON PERFORMANCE

3.1 Secondary Process Observations

Ron Vien and his staff made daily visual observations for changes in the behavior or appearance of the wastewater lagoons, the appearance of the filtrate, and any negative impacts to the plant effluent. The wastewater department recorded their observations on weekly reporting sheets developed for the Septage Pilot Study. GSS and WPCF staff made daily observations of the septage processing, filtrate appearance, and consistency of the dewatered solids when dumped in the temporary holding area. When on-site, TEC and the NH DES staff made similar physical observations to the septage processing, filtrate appearance, consistency of the solids, and the appearance of the lagoons.

During the months of May and June of 2003, the primary lagoon showed signs of floating solids at the headworks, foaming around the surface aerators, floating solids at the water's edge, an increase in algae concentration, and duckweed growth on the primary lagoon. These occurrences, while not observed to affect effluent quality, were noted for a period of weeks.

A strong correlation was made between the polymer usage and the solids separation at the headworks, the foaming in the primary lagoon, and the persistence of floating solids at the water's edge. Despite several adjustments to polymer strength and the polymer feed valves, the polymer application rate and volume were difficult to track under the pump and header arrangement initially used to process septage. The polymer application rate became more predictable under the batch-processing scheme adopted later in the season.

TEC and DES suspected the initially high concentration of phosphorous in the septage filtrate was prolonging the spring algae bloom and likely promoting the spread of duckweed on the primary lagoon. Results of the bench scale testing performed in mid-June verified that the polymer strength and application rate needed adjustments downward (strength reduced by 75%) and that the addition of ferric chloride would reduce filtrate phosphorous by up to 90%, versus using only polymer. The optimum ferric chloride dose was 1.5 gallons $FeCl_3$ to 1000 gallons of raw septage, and the polymer dose was 2 lbs. polymer mixed with 100 gallons of water, added to 1000 gallons of raw septage. Bench testing demonstrated that vigorous mixing of the ferric chloride with raw septage, followed by slow, short-term mixing of the polymer, yielded excellent coagulation and settling characteristics, yielding a very clear filtrate with gravity settling. GSS promptly reduced the polymer feed strength and the foaming and floating solids in the primary lagoon diminished almost completely.

3.2 Effects of Septage Batch Processing

During the months of July and August of 2003, GSS continued using the pump and header system for chemical addition. However, coagulation of solids at the “DeTainer” dewatering trailer was observed by TEC to be very inconsistent with a “pin floc” passing through into the filtrate. Adjustments were made to slow the transfer pump output from the header system to the dewatering trailer. However, poor filtrate quality and iron staining of the residuals was still evident. Once the 2000-gallon batch tank was put on line, the chemical addition became more consistent and the filtrate clarity improved considerably.

For the months of September and October of 2003, GSS continued using the 2000-gallon batch-processing scheme. Filtrate total phosphorous levels were consistently less than 2ppm and often times less than 1ppm. The pilot study was cut short in early November 2003 due to below freezing weather and its impact on the operation of the portable equipment. It is significant to note that no measurable degradation of effluent quality was observed over the 30-week study.

The 2004 continuation of the Pilot Study employed many of the same principals of the earlier year but with certain refinements to the septage processing. GSS moved the screening device to the discharge point of the septage hauler’s truck then pumped the screened raw septage into the holding tankers. Lime, if needed, was added after screening and pumped into the holding tanker along with the raw septage. GSS also improved the chemical feed pumps using an electric pump for the ferric chloride and a fully calibrated metering pump system with day tank for the polymer addition. Batch processing was still practiced but GSS switched from batch mixing in the 2000-gallon tank to batch mixing in the 8000-gallon tankers. This improved the cycle times of processing loads through the dewatering trailer.

Despite a 25% increase in septage volume for 2004, GSS continued to use a single, 20-cubic yard gravity dewatering container. Filtrate quality varied similarly to the 2003 study period but in general the quality was acceptable. The total solids content of the dewatered septage as dumped from the trailer ranged from 10% to 18% and averaged approximately 12.5%. The target value of >15% total solids, as claimed by the dewatering trailer manufacturer, proved difficult to achieve with the one 20-cubic yard container.

The WPCF staff again took charge of the residuals management process. Fresh loads of septage solids were dumped on a wood ash pad then covered with wood ash after dumping to minimize odors and provide a level of vector control. The WPCF staff periodically blended the septage solids with wood ash, sand, wood chips and sawdust throughout the septage hauling season. The materials were blended and stockpiles formed at the farthest point from the fresh solids being dumped on site. Approximately 210 (dry) cubic yards of septage solids were blended with the amendment materials during the 2004 Pilot Study. Ultimate disposal of the blended material will be on the side slopes of the wastewater treatment lagoons within the fenced boundary of the WPCF.

3.3 Results of Plant Effluent Monitoring

Along with the effluent monitoring required in Pittsfield's NPDES Discharge Permit the Pilot Study incorporated monitoring for additional parameters with samples taken from the raw septage, the septage filtrate, the plant influent, the primary lagoon and the plant effluent. Tracking certain parameters through the treatment plant provided one means of predicting potential impacts to the treatment process. Monitoring the final effluent for these same parameters provided a basis for quantifying the loading to the receiving stream and measuring the aerated lagoon process' ability to effectively treat the filtrate.

Over the course of the two-year study effluent total phosphorous ranged from a monthly average of 0.7 to 1.4 mg/l (based on periodic grab samples). Effluent ammonia concentrations ranged from a monthly average of <1.0 mg/l to 7.2 mg/l. Effluent TKN concentrations ranged from a monthly average of <1.0 mg/l to 12 mg/l. Plant effluent COD concentrations ranged from a monthly average of 20 mg//l to 90 mg/l. Other parameters such as CBOD, TSS and pH all fell within their normal ranges without a monthly violation of the NPDES permit over the two-year Pilot Study.

4. SEPTAGE RESIDUALS MANAGEMENT

4.1 Septage Residuals Management

Septage residuals management is not typically practiced at wastewater lagoon facilities. As such, the wastewater staff had no dedicated equipment or particular training in handling the septage solids. GSS provided an estimate of 25 cubic yards (cy) of septage residuals produced per 100,000 gallons of septage processed through the “DeTainer” dewatering trailer. Resource Management Inc. (RMI) developed a simple residuals management plan for storing, amending, and applying the material within the fence line of the wastewater facility.

RMI developed a four-stage septage solids management plan: (1) dumping in wind rows, (2) vector/odor control using wood ash, (3) amending the septage solids with short paper fiber blended with sand, and (4) on-site application of the soil amendment byproduct within the fence line of the WPCF. A layer of wood ash was spread on the ground prior to dumping each load of dewatered septage solids.

The Wastewater Department designated the grassed area between the operations building and the disinfection building as the residuals management area for the pilot study (approximately 40' x 140'). The wastewater staff stripped loam from this area and used it to create a protective berm surrounding three sides of the residuals management area. The opening at the east end was used to enter and exit the residuals management area. The subsoil within the bermed area exhibited relatively poor drainage characteristics with surface water collecting at a natural low point within the bermed area and evaporating over time.

GSS estimate of 25 cubic yards per 100,000 gallons of septage processed ultimately proved to be conservative. Septage processing of 600,000 gallons of raw septage produced approximately 125 cubic yards of dry septage solids or 20% less than anticipated. Table 4-1 is a summary of the septage solids produced during the pilot study. The wastewater staff observed septage solids volume reductions in the static piles of septage solids likely due to break down from exposure to sunlight and summer heat. Steam was observed rising from the piles on several occasions, yet minimal odors were present. Despite the lack of odors, the wastewater staff and GSS were diligent about covering the static piles with wood ash. This natural “composting” effect clearly reduced the height of the piles over time reducing the volume of septage solids to be blended with the soil amendment products.

To amend the septage solids, RMI hauled in 210 cubic yards of short paper fiber and the wastewater staff purchased approximately 300 cubic yards of sand. Both products, along with the remaining wood ash, were blended together using a backhoe and loader. Since the total septage solids produced from the pilot process were less than anticipated, RMI recommended blending all products at the end of the season.

Table 4-1 Septage Solids Generated - 2003 / 2004

TEC-05

Month	Septage Received and Processed 2003 gallons	Septage Received and Processed 2004 gallons	Septage Wet Solids Generated 2003 cy	Septage Wet Solids Generated 2004 cy
May	57100*	129950	10.6	31.72
June	98250	104550	37.2	38.58
July	104900	117950	24.7	52.42
Aug	118300	156000	34.6	63.31
Sep	124300	140950	51.3	54.48
Oct	8200	136775	15.4	40.08
Nov	14050**	-	-	-
Totals	**598,900**	**784,425**	**174**	**281**
			(125)	*(210)*
			(dry)	*(dry)*

* Based on two weeks septage receiving

** Based on one week septage receiving

4.2 Residuals Quality

RMI tested the manufactured topsoil for the 10 EPA metals. Copper was the most notable constituent at 370 mg/kg. Wood ash, the primary means of odor control for the septage residuals, was used sparingly as very little odor resulted from the temporary stockpile area. RMI chose the short paper fiber for its erosion-resistant qualities and its ability to retain water, promoting seed development and growth during dry periods. The added benefit of slow-release nitrogen from the septage solids created a beneficial topsoil product with more nutrients available than native topsoil. RMI also tested the blended product for salmonella, enteric viruses, and helminth ova. The results indicate that the final soil amendment product meets the criteria for a "Class A" residual.

Throughout the 2003 Pilot Study RMI was an integral part of the team that developed the goals and procedures relating to residuals storage, residuals amendments, stockpiling and reuse. By the start of the 2004 season RMI no longer played an active role in the Pittsfield Pilot Study, instead focusing on septage residuals management at the State owned and operated regional wastewater facility in Franklin, New Hampshire. The State owned facility recently received a $1 million grant to study the feasibility of developing a regional septage residuals management program. While the Town of Pittsfield was disappointed to have RMI back out of the Pittsfield project, the future prospects for RMI in Franklin may provide a long-term outlet for Pittsfield's septage residuals to become part of a broad-based, regional recycling operation.

In order for the Pittsfield WPCF staff to manage septage residuals long-term they will need to be diligent about thoroughly blending the amendments with the septage solids to achieve a consistently high quality product. Factors such as volume reductions due to air-drying, natural heat composting and pathogen reduction from sunlight, and moisture and pathogen reductions from freeze/thaw cycles will also improve residuals quality.

5. ALTERNATIVE SITES ANALYSIS

5.1 Septage Receiving Site Requirements

The portable equipment provided by GSS and the Town was adequate for the 2003/2004 Pilot Study. However, a long-term septage receiving expansion will require several refinements to the pilot process. It appears that an enhanced septage receiving station and residuals management area will not require a substantial tract of land. Regardless, the ability to expand the septage receiving and the residuals management area will factor heavily into the site selection process. The septage receiving area for the pilot process was sited on approximately 1/3-acre, while the stockpile area required approximately ½-acre. To support the blending and soil amendment operation for a design basis of 5 million gallons of raw septage per year, the Town will need to dedicate additional acreage to a permanent septage operation.

The Town of Pittsfield has a number of alternatives available to locate an enhanced septage receiving station and residuals management area. The pilot study was conducted on the treatment plant grounds within the fence line of the existing wastewater facility. The Town owns a 90-acre parcel of land to the west of the treatment plant that directly abuts the treatment plant property. This parcel already has a long gravel access road through the center of the parcel, significant wooded buffer areas to adjoining properties, and an old gravel pit area with acres of graded, nearly level open space.

TEC considered several criteria in evaluating the areas available to site an enhanced septage receiving station. Factors in the site selection process include: access to existing utilities, sufficient buffer to reduce off-site odor incidents, easy accessibility to the septage haulers, wastewater operator friendly, relatively easy to secure, reasonably easy to obtain environmental permits, and relatively easy to construct. A ranking system was developed to compare the sites to one another based on the selected criteria. Sites exhibiting the most favorable characteristics for a given set of criteria received a score of 5 points, those exhibiting favorable characteristics received a score of 3 points, and those exhibiting one or more obvious limitations were assigned a score of 1 point. Based on the area used for the pilot project receiving station, the minimum size of a permanent receiving facility was set at 1-acre. Future expansion capabilities were limited to an additional 1-acre to accommodate more storage tanks, truck staging, and turning movements.

5.2 Residuals Management Site Requirements

TEC used a similar process to rank potential residuals management sites. Based on the area used for the pilot project soil amendment operation, the minimum size of a permanent septage management area was set at 0.5-acres (assuming the septage solids were processed and removed from the facility on a regular basis). Several acres might be needed if a slow aging process or long-term stockpiling process is desirable. Future expansion capability is necessary, but was not limited to a specific size, realizing that several methods are available to process and remove the solids from the site. Of the three potential residuals management sites, one is situated within the fence line of the existing wastewater facility. The other two sites are situated on the adjoining 90-acre parcel.

5.3 Combined Sites Ranking of Alternatives

Clearly, the Town of Pittsfield has an opportunity to make immediate use of a portion of the abutting 90-acre parcel for improvements to the wastewater facility. The value of this land and the surrounding wooded buffer zones it offers are unique with today's land use patterns. Southern New Hampshire communities have seen unprecedented growth in the past 5 years and will continue to be pressured as the planned I-93 widening project is completed over the next ten years. The Town must decide whether the long-term value of retaining the 90-acre parcel for the wastewater facility and other Town functions outweighs the short-term prospects of allowing the parcel to be sold for development.

5.4 Receiving Station Equipment Alternatives

To operate a long-term septage receiving station the Town of Pittsfield will need better equipment, with a longer service life than the temporary equipment used in the pilot study. Three Septage Receiving Configurations (SRC) were considered for comparative purposes. SRC-1 mirrors the 2003/2004 Pilot Study with portable equipment, primarily manual operations, and above ground components. SRC-2 incorporates mechanical screening, below ground storage tanks, metered chemical feed systems, and larger capacity containerized gravity dewatering devices. SRC-3 employs fully automated processes, to the extent possible, and includes a rotary press dewatering system.

As a basis for comparison TEC is assuming a 20-year service life for the new receiving station. Criteria for selection includes: ease of operation for the septage haulers and wastewater operators, man-hour requirements, durability, serviceability, space requirements, capital cost, operating cost and replacement cost. TEC developed a relative ranking system to compare the three septage receiving configurations: the most favorable characteristics get a "high" score of 5, generally favorable characteristics get a "moderate" score of 3, and less than favorable characteristics get a "low" score of 1.

Tables 5-4 and 5-5 display the comparative ranking of the processes indicated for each of the septage receiving configurations.

Table 5-4 Process Approach for Three Septage Receiving Configurations

TEC-05

Septage Recv. Configuration	Equipment	Screening	Chemical Addition	Septage Processing	Mixing	Solids Dewatering
SRC-1	portable	manual	manual	batch	pumped	container
SRC-2	combined	mechanical	automated	batch	VS Mixers	container
SRC-3	fixed	mechanical	automated	continuous	VS Mixers	Rotary Press

Table 5-5 Comparative Ranking of Three Septage Receiving Configurations

TEC-05

Relative Ranking 5 = High 3 = Moderate 1 = Low

Criteria for Selection	Configuration Number SRC-1	SRC-2	SRC-3
Ease of Operation - WW Staff	3	5	5
Ease of Operation - Septage Haulers	1	5	5
Weekly Man-Hour Requirements	1	3	5
Durability / Serviceability	3	3	5
Space Requirements	3	3	5
Capital Cost	5	3	1
Operating Cost	5	3	3
Replacement Cost	5	3	1
Preliminary Ranking	26	28	30

SRC-1 is practically a mirror image of the 2003/2004 Septage Pilot Configuration using temporary equipment arranged in a series to allow for daily manual batch processing. The area required for SRC-1 is more than twice that of the 2003/2004 Pilot Study due to the need to accommodate additional storage tanks to handle greater daily volumes. Advantages to SRC-1 are the relatively low capital costs to acquire equipment, the short construction and start-up times, and the portability of moving or adding components to the system. Limitations to SRC-1 are the significant daily man-hours required to process batch loads through the system, potential inaccuracies in recording total volume processed, limited control over chemical addition, marginal mixing times, and the cycle time required to process solids through the gravity dewatering trailers.

SRC-2 is configured with fixed components including: a dedicated screening structure, underground storage tanks, metering pumps for chemical addition, dedicated mixers with batch tanks, and larger capacity “roll-off” type gravity dewatering containers. Advantages to the SRC-2 configuration include: a smaller footprint for the dedicated equipment, fewer man-hours required for processing batches, partially enclosed equipment, and improved solids dewatering capacity. Limitations to the SRC-2 configuration include: daily screening and grit disposal, batch processing/limited feed rate at the dewatering equipment, and potential odors at the dewatering process resulting from slow-rate dewatering equipment.

SRC-3 is configured similarly to SRC-2 with the exception that the dewatering process uses an enclosed Rotary Press. The Rotary Press accepts a wide range of feed rates and is able to process septage solids on a continuous feed basis. The Rotary Press requires less space than conventional dewatering equipment and does not generate odors like the open-air systems (such as an open top container or a belt filter press). Advantages are similar to SRC-2, with the Rotary Press able to produce a consistent, drier cake than conventional dewatering systems, leading to even less residuals volume for handling, stabilization, and disposal. The primary limitation is the need for daily wastewater operator attention to disposing of screenings and grit on a daily basis.

5.5 Residuals Management Process Alternatives

The Pittsfield WPCF does not have a solids processing stage as part of the wastewater lagoon treatment process. As such, alternatives for adding a septage (residuals) management process at the wastewater facility are not restricted by current practices. However, unlike a wastewater facility that processes sludge and septage solids on a daily basis, the type of process selected for Pittsfield must be compatible with the seasonal usage and relatively low volume of solids generated annually.

Most biosolids management programs in New Hampshire treat sludge and septage to Class B pathogen requirements. Much of this material is land applied, landfilled, or disposed of at out-of-state facilities. Currently in New Hampshire, the NH DES rules for Sludge Management (Env-Ws 800) and for Septage Management (Env-Ws 1600) regulate the ultimate fate of the processed solids based on measurable limits for metals, pathogens, and specific nutrients. Alternatives that would ultimately produce an “Exceptional Quality” (EQ) or at the very least a “Class A” residual (by current rules) are preferred, as this would afford Pittsfield the greatest potential for beneficial use of the amended septage solids. TEC is of the opinion that the septage residuals management process selected for Pittsfield should be capable of reliably meeting the Federal and State requirements for producing an EQ or Class A septage residual, suitable for beneficial reuse.

Achieving an EQ residual would require adherence by the septage haulers to the limitations of receiving only domestic septage at the receiving facility, as well as strict attention by the receiving station operator to the additional chemical and dewatering processes. Regular analytical testing would have to be done to earn and uphold the EQ rating. Likewise, a dewatering process that can yield a total solid content of 25% or better will reduce the volume of solids to be handled as part of the residuals management operation.

A “Class A” residual is one that is derived from human waste which is "Class A" with respect to pathogens under 40 CFR Part 503.32(a) and which meets one or more of the vector attraction reduction requirements of 40 CFR Part 503.33(b)(1) through (b)(8). These levels must be measured, documented, and reported by the facility operators. In addition, “Class A” residuals should have relatively low metals content and a fairly neutral pH level.

Septage receiving is seasonal in nature in New Hampshire with most septage haulers reporting increased activity from mid-March through October. This fact makes a significant capital investment in a highly sophisticated process impractical for a part-time residuals management operation. Systems like temperature-phased anaerobic digestion, in-vessel composting, and even aerated static pile composting require a significant capital investment in equipment and buildings; as well as operational costs which include daily man-power, electrical costs, and dedicated odor control systems. Also, these systems typically function better if operated continuously as opposed to start-stop operation.

For comparative purposes, three residuals processing options were reviewed for Pittsfield. Option One includes proper stabilization after dewatering, blending with sand and short paper fiber, and stockpiling for use as a soil amendment. Option Two includes proper stabilization after dewatering, blending with wood ash, leaf and yard clippings, sawdust, and followed by long-term stockpiling for use as a compost product. Option Three is a modified, aerated compost system as developed by Green Mountain Technologies. All three options assume stockpiling and handling areas will be done on an impervious surface, with proper surface water control and treatment.

6. RECOMMENDED SEPTAGE EXPANSION PLAN

The septage receiving and residuals management alternatives presented in this report were assessed based on conceptual arrangements of several components needed to duplicate the pilot process. The 2003/2004 data from the Pilot Study demonstrated that pre-treatment of the raw septage and dewatering of the septage solids prior to discharging filtrate to the aerated lagoon process is a viable alternative for increasing septage receiving at a wastewater lagoon facility. The preliminary design basis for a permanent septage receiving and residuals management operation was derived using data from the two-year pilot study as well as established performance criteria for the wastewater facility.

6.1 Site Selection

TEC met with the Pittsfield Town Administrator, the Wastewater Superintendent and the Chairman (past) of the Board of Selectmen to review the Draft Septage Pilot Study report. An open discussion on the merits of each alternative site and how they relate to the long-term maintenance and operation of the overall wastewater facility resulted in Pittsfield's representatives making the following selections: Site A for septage receiving and Site 3 for the septage residuals management. Site A is located to the southeast of the operations building at the site of the temporary receiving station used during the pilot study. Site 3 is the gravel pit site located on the adjoining Town property more than 2500 feet to the west of treatment lagoon number two.

Site A was identified as the preferred receiving station site for the following reasons:

- Access drive to receiving station just inside WWTF gate.
- High visibility from the Operations building to Site A.
- Potential for separate egress drive from Site A providing one-way traffic (safety).
- Easy access by WWTF staff to collect samples and monitor receiving operation.
- Easy access to retrieve and transport dewatered septage solids.

Site 3 was identified as the preferred septage solids management site for the following reasons:

- Meets all regulatory setback requirements.
- Exceeds minimum setback distance from dwellings on abutting properties.
- Extensive area available at the gravel pit site to expand the solids operation.
- Immediately adjacent to source of sand for soil amendment operation.
- Sufficient room to store bulking agents (wood ash, short paper fiber, leaf/yard waste).
- Sufficient space to erect one or more covered storage facilities.
- Potential to reuse amended septage solids for gravel pit reclamation.

With the potential for septage processing volumes to increase over time the preferred sites are more than adequate to allow for expansion in the form of additional tanks, equipment, storage and residuals reuse on Town property. The high ground on the adjoining 90-acre parcel between the gravel pit (to the west) and the treatment lagoons (to the east) underwent a geotechnical investigation to ascertain the land's potential to support a groundwater discharge. This 25 + acres was found to have insufficient capacity to treat the 400,000 gallons per day of wastewater effluent from the three cell lagoon system. However, it could easily support future septage solids stockpiling as well as treated filtrate discharge of up to 60,000 gallons per day, the hydraulic limit suggested by Geotechnical Services Inc. based on the results of their geotechnical site investigation work on the 25+ acre area.

In recommending a plan of action to proceed with design and construction of an expanded septage receiving station at the Pittsfield WPCF a preliminary design basis and associated cost estimate are presented for design review consideration.

6.2 Preliminary Design Basis

From a design perspective the proposed septage expansion project is similar to that of an innovative/alternative technology with the proposed septage expansion consisting of pre-treatment of a waste stream with solids removal prior to filtrate discharge to the WPCF. The proposed basis of design includes:

- Present and future flow and solids generation.
- Anticipated organic and nutrient loading rates.
- Preliminary design concept.
- Opinions of cost.
- Proposed implementation schedule.

6.2.1 Present and Future Flow and Solids Generation

The septage generation from Pittsfield and the 14 surrounding towns identified as being within the service area is a function of population growth in the rural areas, frequency of septic tank pumping, and future availability of legal outlets for septage disposal outside of the service area. Predicting any of these items with a high degree of certainty is questionable. However, a look at projected population growth for towns within the service area as well as the percentage of volume these towns contributed during the pilot program provides a reasonable basis for projecting future (2025) septage volumes.

Pittsfield and the 14 towns within the service area generate a little more than 4 million gallons of septage annually for pumping and disposal (Source: NH DES Residuals Management Section). Five towns within the service area already have a formal agreement to dispose of their septage at the Pittsfield WPCF. Along with Pittsfield's septage, the combined annual volume, including the five towns, is almost 1.6 million gallons. At a projected annual average growth rate within the service area of 1.6% a 2025 septage volume of approximately 2.2 million gallons is arrived at for Pittsfield and the surrounding towns.

The septage volume received during the 2003-2004 Pilot Program originated largely within the service area. From the data sets for septage volume received (by town) it appears that approximately 25% of the total septage volume each year came from other towns not having a formal agreement with Pittsfield. Using the projected flow of 2.2 million gallons per year (for Pittsfield and the five towns) and adding to that another 25% or 0.55 million gallons yields a projected 2025 septage volume of 2.75 million gallons per year. TEC proposes a ***design flow basis of 3 million gallons per year*** for the expanded septage receiving station.

Along with the liquid stream of incoming septage consideration must be given to the anticipated volume of solids generated from the septage pre-treatment and solids dewatering operation proposed for the Pittsfield WPCF. GSS reported that a total of 455 cubic yards of wet septage solids was produced during the 2-year Pilot Study. During that same period a reported raw septage volume of 1.375 million gallons was processed through the pre-treatment system. Assuming a direct correlation exists between the raw septage volume processed and the resultant volume of septage solids produced one arrives at an approximate ratio of 1 cubic yard of solids per 3000 gallons of raw septage processed (based on an average 12% solids from the gravity dewatering trailer). With the proposed design flow of 3.0 million gallons per year the septage solids residuals management operation should be designed to handle up to *1000 cubic yards per year of septage residuals.*

6.2.2 Anticipated Nutrient and Organic Loading Rates

Section 2 of this report discussed the 2003-2004 septage processing schemes and the importance of batch mixing and chemical addition on filtrate quality from the dewatering operation. Throughout the 2003-2004 Pilot Study specific parameters were monitored on a regular basis to gauge filtrate quality, its impacts on the wastewater treatment lagoons and its correlation to raw wastewater strength entering the WPCF. Table 6-2 lists the range of concentrations (average) for select organic and nutrient parameters for the 2003-2004 study.

Table 6-2. Septage Filtrate Strength and Loading Indicated by Field Data			
(Source: 2003-2004 Pilot Study Data)			*TEC 05*
(Filtrate Loadings based on 2-yr average volume of 690,000 gal)			
Parameter	**Two Year Range of Average Values (mg/l)**	**Estimated Average Annual Loading (lbs)**	**Percent Increase in Plant Infl. Load**
Total Phosphorous	**0.2 to 12**	**14**	**0.50%**
Ammonia	**71 to 242**	**605**	**3.68%**
TKN	**85 to 180**	**692**	**2.82%**
COD	**450 to 1200**	**4162**	**2.47%**
CBOD	**198 to 928**	**3002**	**2.82%**
TSS	**33 to 192**	**539**	**0.37%**

As a preliminary design basis the average organic and nutrient loadings that septage filtrate will have on the WPCF are predicted to be on the low end of the ranges shown in Table 6-2. The reasoning behind this is that a permanent facility with dedicated equipment such as mechanical screening and grit removal, raw septage flow measurement, chemical feed pumps, multiple batch and blend tanks and variable speed mixers will perform more consistently than the temporary equipment arrangements used by GSS. Recommended design organic and nutrient loadings of the septage filtrate are presented in Table 6-3. The selected loading rates are predicated on the Town of Pittsfield WPCF continuing to limit septage intake to domestic septage only with no industrial, commercial, chemical toilet or hazardous material processed at the WPCF.

Table 6-3. Recommended Design Criteria for Septage Loadings			
			TEC 05
Parameter	**Raw Septage**	**Septage Filtrate**	**Septage Solids**
pH	> 7.0	6.0 to 9.0	n.a.
TSS	n.a.	max day = 175 mg/l	n.a.
		mo. avg = 110 mg/l	n.a.
CBOD	n.a.	max day = 600 mg/l	n.a.
		mo. avg = 450 mg/l	n.a.
Total Phosphorous	n.a.	max day = 4.5 mg/l	n.a.
		mo. avg = 2.0 mg/l	n.a.
Total Solids	n.a.	n.a.	>= 15% TS
Source	domestic only	Pittsfield pre-treatment process	Pittsfield dewatering process

6.2.3 Preliminary Design Concept

The 2003-2004 Pilot Study process proved reliable in adequately diminishing the strength of septage filtrate so that it could be blended with the raw wastewater influent and treated as part of the aerated lagoon process. GSS did a commendable job both years adapting the process to changes along the way to produce a fairly reliable filtrate quality. For the Town of Pittsfield to invest in a long-term septage solution for their residents and those of the service area the septage pre-treatment process needs to be designed to produce a reliable, low-strength filtrate under a variety of conditions. Key components to achieve reliable treatment include screening, grit removal, holding tank capacity, odor control, chemical addition, blending and dewatering.

The temporary equipment used for the pilot study was economical for GSS to acquire but was labor intensive and restricted to warm weather (mid-April through October). TEC has developed a design concept that incorporates each of the key components mentioned above yet is intended for year-round septage processing. Figure 6-1 is a conceptual process schematic for a proposed septage receiving station. The holding tanks and blend tank are intended to be concrete tanks below grade to minimize the footprint of the receiving station as well as the building shell erected above grade. Provisions would be made within the concrete tanks and building to accommodate piping odorous air to a future bio-filter that would be located behind the receiving station.

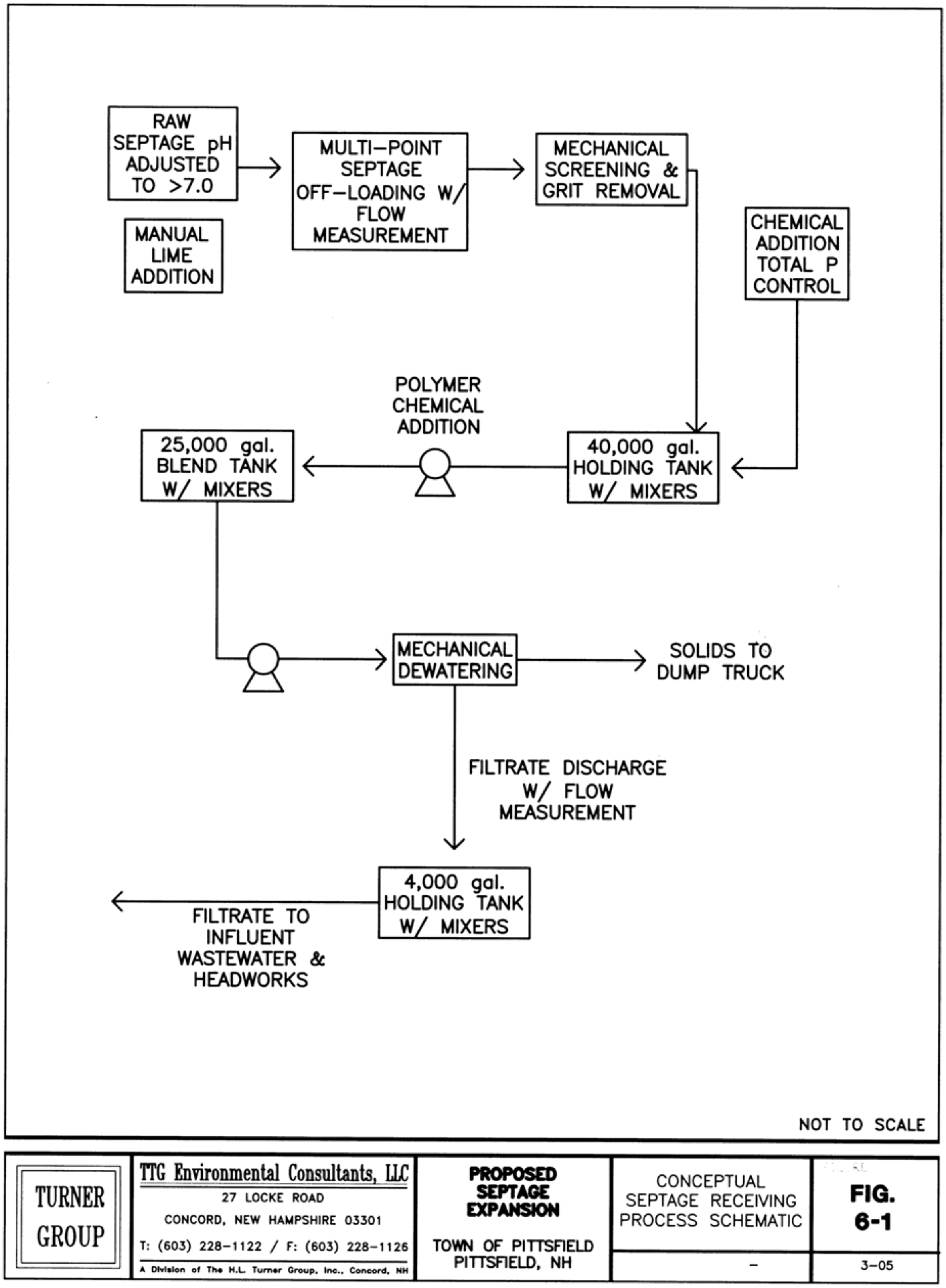
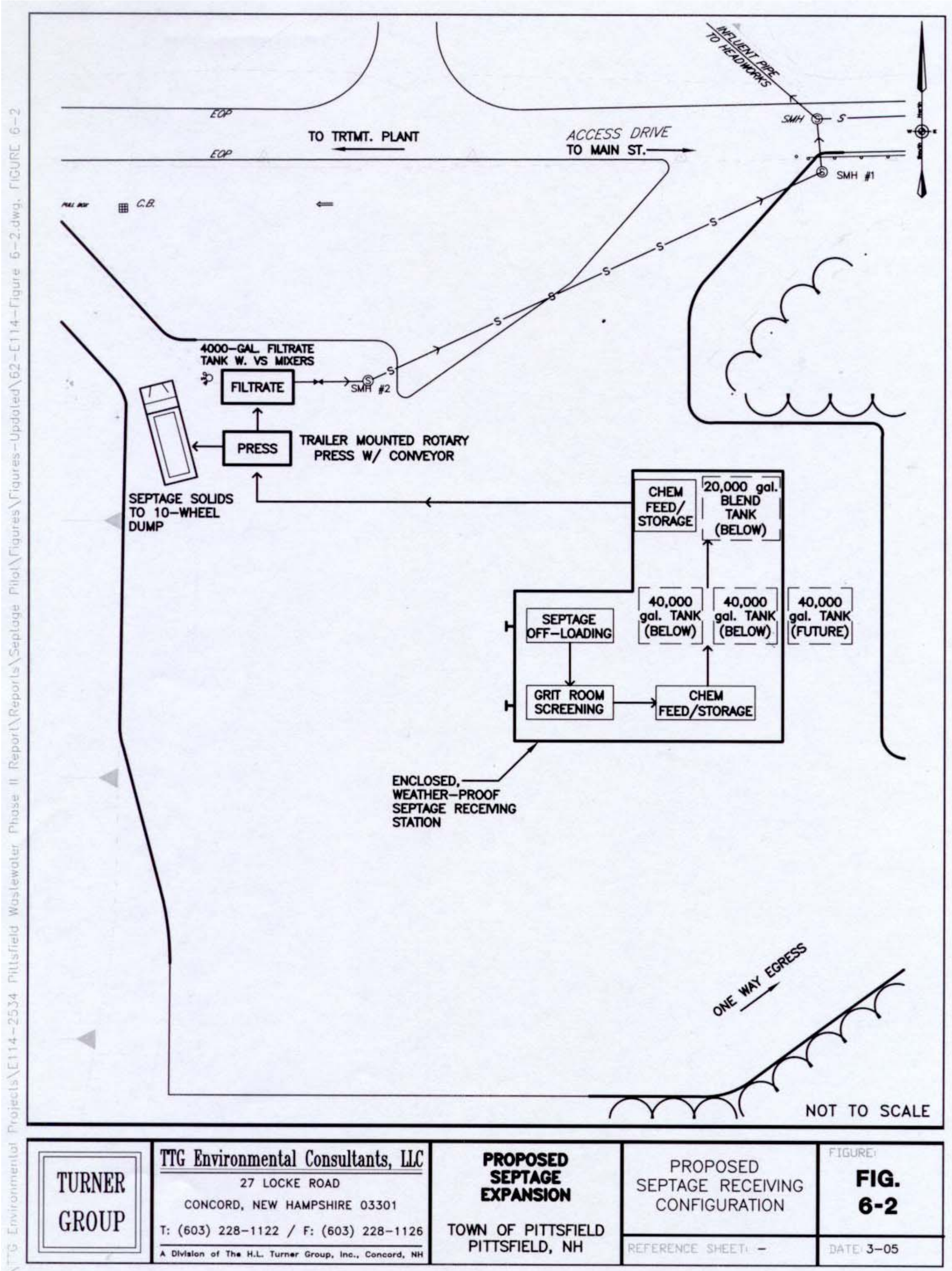
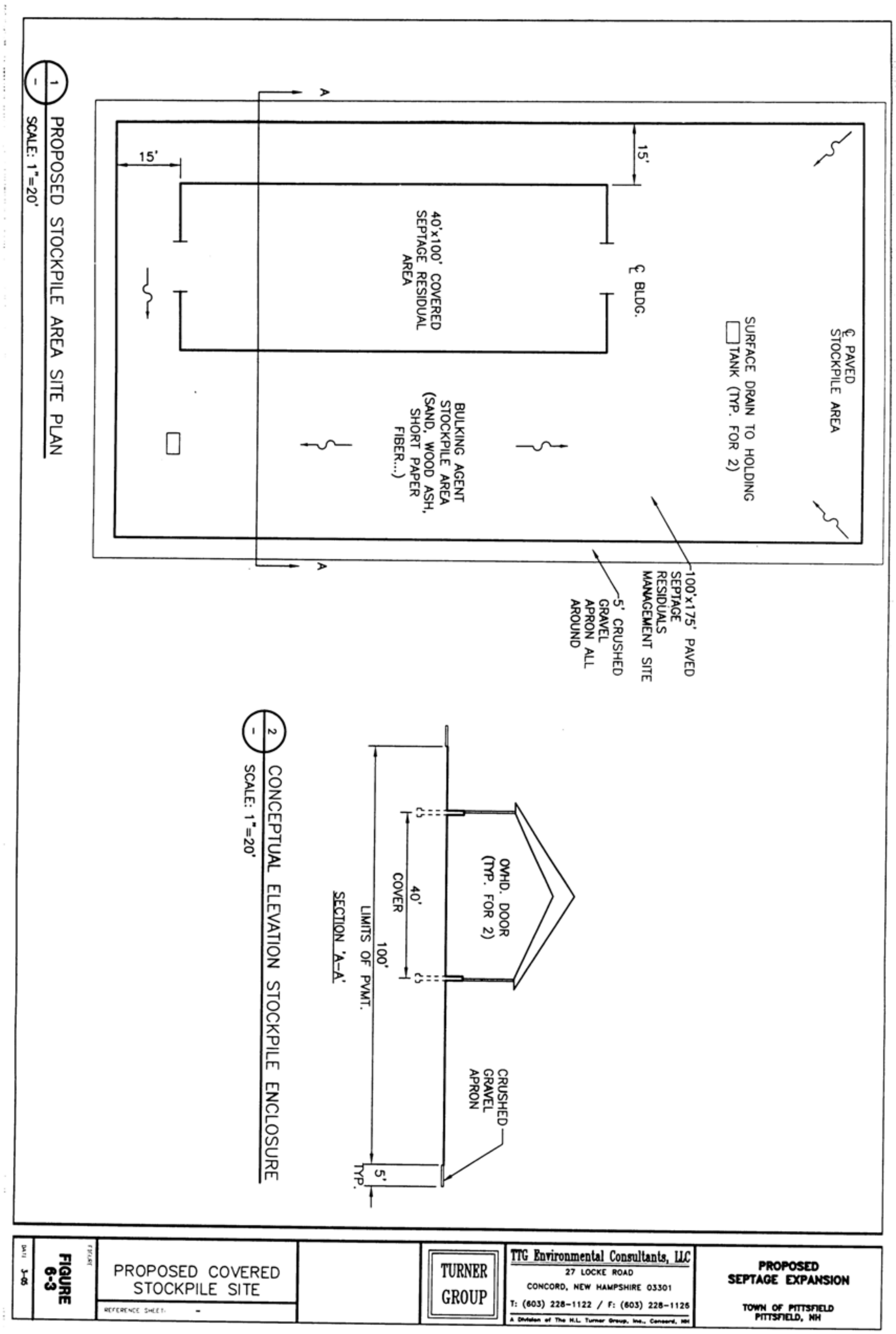

RAW SEPTAGE pH ADJUSTED TO >7.0
MANUAL LIME ADDITION
MULTI–POINT SEPTAGE OFF–LOADING W/ FLOW MEASUREMENT
MECHANICAL SCREENING & GRIT REMOVAL
CHEMICAL ADDITION TOTAL P CONTROL
POLYMER CHEMICAL ADDITION
25,000 gal. BLEND TANK W/ MIXERS
40,000 gal. HOLDING TANK W/ MIXERS
MECHANICAL DEWATERING
SOLIDS TO DUMP TRUCK
FILTRATE DISCHARGE W/ FLOW MEASUREMENT
4,000 gal. HOLDING TANK W/ MIXERS
FILTRATE TO INFLUENT WASTEWATER & HEADWORKS
NOT TO SCALE
TURNER GROUP
TTG Environmental Consultants, LLC
27 LOCKE ROAD
CONCORD, NEW HAMPSHIRE 03301
T: (603) 228–1122 / F: (603) 228–1126
A Division of The H.L. Turner Group, Inc., Concord, NH
PROPOSED SEPTAGE EXPANSION
TOWN OF PITTSFIELD
PITTSFIELD, NH
CONCEPTUAL SEPTAGE RECEIVING PROCESS SCHEMATIC
FIG. 6-1
–
3–05

Figure 6-2 is a conceptual plan of the proposed septage receiving station. The septage off-loading area would be designed to accommodate two trucks dumping simultaneously into one mechanical screening and grit removal system. Raw septage flow would be measured by a flow meter in line between each truck and the screening device. The screened septage would then dump into a holding tank where chemicals would be added for phosphorous control. Mechanical mixers in the holding tank would homogenize the raw septage that would then be pumped into a blend tank. Polymer would be added at the blend tank, gently mixed and pumped to the dewatering device(s). Filtrate from the dewatering device(s) would be discharged into the 4000-gallon holding tank already on site allowing for visual inspection and sampling of the filtrate prior to blending with raw wastewater entering the WPCF.

Depending on the type of dewatering device used at the septage receiving station (roll-off container, trailer dump or 10-wheel dump truck) the septage solids could be transported to the residuals management site at the former gravel pit. Figure 6-3 is a conceptual plan of the residuals management area. Access to the paved residuals management and stockpile area can be over public roads (Dowboro Road) or, if the project budget allows, over a private access road built from the WPCF property along an old railroad grade directly to the former gravel pit. The residuals management site will consist of a paved blending and stockpile area with one portion of the paved area covered for long-term residuals holding. The pavement will drain to one or more collection tanks below grade that can be pumped out periodically with the contents treated at the WPCF.

The Town of Pittsfield has several options for disposing of the septage residuals. The initial plan is to continue making a soil amendment product so long as sufficient area is available at the WPCF site and the former gravel pit site to reclaim and reseed otherwise barren soil. Initial tests by RMI as part of the 2003 Pilot Study indicated that the soil amendment met “Class A” standards. The Town of Pittsfield is committed to producing a “Class A” or “EQ” residual to improve the opportunities for reuse. Sufficient land area is available at the former gravel pit site to expand the limited septage residuals processing area into a regional septage solids processing facility if economic conditions warrant such an investment by the Town or another entrepreneurial party.


INFLUENT PIPE TO HEADWORKS
SMH
S
EOP
TO TRTMT. PLANT
ACCESS DRIVE
TO MAIN ST.
SMH #1
C.B.
4000-GAL. FILTRATE TANK W. VS MIXERS
FILTRATE
SMH #2
PRESS
TRAILER MOUNTED ROTARY PRESS W/ CONVEYOR
SEPTAGE SOLIDS TO 10-WHEEL DUMP
CHEM FEED/ STORAGE
20,000 gal. BLEND TANK (BELOW)
40,000 gal. TANK (BELOW)
40,000 gal. TANK (BELOW)
40,000 gal. TANK (FUTURE)
SEPTAGE OFF-LOADING
GRIT ROOM SCREENING
CHEM FEED/STORAGE
ENCLOSED, WEATHER-PROOF SEPTAGE RECEIVING STATION
ONE WAY EGRESS
NOT TO SCALE
TURNER GROUP
TTG Environmental Consultants, LLC
27 LOCKE ROAD
CONCORD, NEW HAMPSHIRE 03301
T: (603) 228-1122 / F: (603) 228-1126
A Division of The H.L. Turner Group, Inc., Concord, NH
PROPOSED SEPTAGE EXPANSION
TOWN OF PITTSFIELD
PITTSFIELD, NH
PROPOSED SEPTAGE RECEIVING CONFIGURATION
REFERENCE SHEET: -
FIGURE:
FIG. 6-2
DATE: 3-05


1
—
PROPOSED STOCKPILE AREA SITE PLAN
SCALE: 1"=20'
15'
15'
40'x100' COVERED SEPTAGE RESIDUAL AREA
℄ BLDG.
℄ PAVED STOCKPILE AREA
SURFACE DRAIN TO HOLDING TANK (TYP. FOR 2)
BULKING AGENT STOCKPILE AREA (SAND, WOOD ASH, SHORT PAPER FIBER...)
100'x175' PAVED SEPTAGE RESIDUALS MANAGEMENT SITE
5' CRUSHED GRAVEL APRON ALL AROUND
A
A
2
—
CONCEPTUAL ELEVATION STOCKPILE ENCLOSURE
SCALE: 1"=20'
OVHD. DOOR (TYP. FOR 2)
40' COVER
100' LIMITS OF PVMT.
SECTION 'A-A'
CRUSHED GRAVEL APRON
5' TYP.
FIGURE 6-3
DATE 3-05
PROPOSED COVERED STOCKPILE SITE
REFERENCE SHEET: -
TURNER GROUP
TTG Environmental Consultants, LLC
27 LOCKE ROAD
CONCORD, NEW HAMPSHIRE 03301
T: (603) 228-1122 / F: (603) 228-1126
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PROPOSED SEPTAGE EXPANSION
TOWN OF PITTSFIELD
PITTSFIELD, NH

6.2.4 Opinions of Cost

A number of cost options are available to the Town of Pittsfield based on the preliminary design concepts presented in Figures 6-2 and 6-3. Table 6-4 presents four opinions of cost for each of four concepts. The "full scale" concept is based on the assumption that the Town uses the most automated screening, grit removal and dewatering systems affordable for septage processing and that the receiving station and septage stockpile areas have some type of building shell covering them. Each successive opinion of cost shown in Table 6-4 indicates some reduction in automated equipment, building shell limitations or site cost reductions. The equipment cost information presented is as quoted from vendors while the site, concrete and building shell costs were developed by TEC using March 2005 dollars.

Table 6-4. Opinions of Cost for Septage Facility Expansion
Pittsfield WPCF, Pittsfield, New Hampshire *TEC 05*

Item No.	Item Description	Full Scale System (a)	Reduced Scale 1 (b)	Reduced Scale 2 (c)	Reduced Scale 3 (d)
1	SRC-3 Site Development Cost:	$188,800	$123,067	$113,067	$113,067
2	SRC-3 Facility Structures and Equipment	$742,000	$594,500	$533,500	$423,500
3	RM-1 Remote Stockpile Site	$165,000	$105,000	$67,500	$50,000
4	Sub-total	$1,095,800	$822,567	$714,067	$586,567
5	Construction Contingency (10%)	$109,580	$82,257	$71,407	$58,657
6	Contractor's General Conditions (18%)	$197,244	$148,062	$128,532	$105,582
7	Engineering Design (8%)	$87,664	$65,805	$57,125	$46,925
8	Engineering Construction Administration (2%)	$21,916	$16,451	$14,281	$11,731
9	Engineering Construction Inspection (5%)	$54,790	$41,128	$35,703	$29,328
10	Total Constructed Cost	$1,566,994	$1,176,271	$1,021,116	$838,791

NOTES:

1	Full Scale: (a)	SRC-3: Permanent Facility with below grade tanks, simple wood frame building, with new "one-way" loop access road for septage hauling trucks. RM-1: Uncovered, paved stockpile area at old gravel pit site with new gravel access road via the old rail road grade.
2	Reduced Scale 1: (b)	Site - eliminate one-way egress roadway including drainage improvements, guardrail, paving, clearing, grubbing, ledge/rock removal, loam & seed. Facility - eliminate Lakeside Septage Acceptance plant equipment (screening & grit removal) and replace with rock box, stainless steel manually cleaned bar rack, and pump to holding tank. Stockpile Site - eliminate roadway construction from treatment plant to gravel pit site.
3	Reduced Scale 2: (c)	Includes Reduced Scale 1 plus: Site - Eliminate all paving at the septage receiving site Facility - reduce holding tank size/capacity by 20% (from 50,000 gallons to 40,000 gallons) and replace trailer mounted rotary press with 2 DT-30 Dewatering Containers. Stockpile Site - purchase used Tractor/loader and Batch Mixer equipment.
4	Reduced Scale 3: (d)	Includes Reduced Scale 2 plus: Facility - eliminate wood frame building Stockpile Site - continue to use current stockpile site with minimal grading, paving and drainage improvements

6.2.5 Proposed Implementation Schedule

The Town of Pittsfield has been working closely with the NH DES Residuals Management Section to develop the 2003-2004 Pilot Study process into a viable, long-term septage receiving and residuals management process that can be used as a model for other wastewater lagoon facilities in New Hampshire. The Town is prepared to move forward with the design of a permanent receiving station upon approval by the NH DES Wastewater Engineering Bureau. The Town remains engaged in the public-private partnership with Septic Disposal Solutions, LLC (a newly formed company by Gosse Septic Service and others) with the intent to run the receiving station and residual management areas using the temporary equipment arrangement for 2005 and 2006 until a permanent facility can be built and put into operation.

In March 2005 the Town of Pittsfield sought and received bonding authority from Town residents for up to $1,566,994.00 to design, bid and construct a permanent septage processing facility. Pending DES approval of this report the Town is prepared to begin design immediately with the goal of completing the project in 2007. Concurrently the Town will be implementing improvements to their secondary treatment process (aeration system) as well as the WPCF disinfection process, electrical service, alarms, telemetry and the Joy Street (main) pump station.

6.3 Residuals Management Plan

The proposed residuals management plan will parallel the process used during the Pilot Study with the exception that the residuals management site will be relocated to the former gravel pit site on Town-owned property adjacent to the WPCF. The new site will have a paved blending and stockpile area as well as some form of cover for long-term storage to take advantage of summer and winter influences that can reduce overall volume prior to disposal.

The two-year Pilot Study data on septage solids indicates that, using the gravity dewatering container, an approximate generation rate of 1 cubic yard of (wet) solids is produced for every 3000 gallons of raw septage processed. The WPCF staff that observed further solids volume reductions believed due to surface evaporation from wind and sun, high heat composting from prolonged exposure to sunlight, and moisture release during repeated freeze-thaw cycles over the winter months.

Additional septage solids volume reductions may be possible on the front end of the process to reduce the man-hour and material costs associated with a long-term residuals management operation. The gravity dewatering container used for the pilot study was inconsistent at times, and only produced an average total solids of 12.5%. Solids capture through the dewatering container ranged from 65% to 98% over the two-year study. Below 95% capture, the filtrate quality was observed to diminish. The goal is to minimize the solids passed through to the WPCF aerated lagoon process. At an average of 12.5% solids the annual solids production for a 3.0 million gallon per year operation approaches 1000 cubic yards. This results in added costs to the residuals management operation due to needing more bulking agents, more man-hours and having more total volume for ultimate disposal.

The cost-revenue models presented in Section 8 and in of this report are based on using a mechanical septage dewatering process to reduce the annual septage solids volume by more than 50%. TEC and the WPCF Superintendent reviewed manufacturers data on several mechanical dewatering devices. The cost-revenue models account for purchasing a trailer mounted, rotary fan press for septage dewatering. This device consistently produces a 25% total solid with >95% solids capture (cleaner filtrate). The additional capital cost and electrical costs to operate this device are offset by having significantly less solids, cleaner filtrate and fewer man-hours to operate the rotary press.

7. REGULATORY PERMITTING

The 2003-2004 Pilot Study was operated within the fence line of the WPCF and as such was regulated under the current National Pollutant Discharge Elimination System (NPDES) permit. However, in order to construct and operate a long-term regional septage receiving facility and septage residuals management operation the Town will need to apply for and obtain other environmental permits from the State of New Hampshire Department of Environmental Services. Initially, the Town will need to apply for a septage facility permit and a groundwater discharge permit. Both permits will likely have conditions that may require quarterly monitoring, sampling, analysis and reporting compliance parameters to the NH DES. If the Town chooses to expand the septage residuals operation in the future to include sludge and septage from other generators in state then the Town will need to apply for a Sludge Facility permit from the NH DES.

7.1 Septage Facility Permit

The NH DES currently regulates the transport, treatment and disposal of septage through the New Hampshire Code of Administrative Rules, Env-Ws 1600, rules for Septage Management. These rules are currently under revision with formal adoption of the new rules expected in the latter part of 2005. Under the proposed rules there are setback requirements that must be considered for the septage receiving station and the residuals management operation. Figure 7-1 is a plan view of the WPCF site and gravel pit site with the current setback limits indicated on the plan. The setback distances shown on Figure 7-1 were taken from the proposed rules.

At the proposed septage receiving station site the 300-ft setback limit for open facilities can be met. The intent is for the receiving station to have weather dependent components of the operation enclosed for year-round operation. However, some portions of the septage receiving operation may not be enclosed within a building so the current site plan indicates that all components will fall beyond the minimum required setback. Also within the rules is a setback distance to surface waters. The proposed receiving station is situated on high ground beyond the required 125-ft. setback distance from surface waters. The conceptual plan accounts for storm water drainage to shed towards the primary treatment lagoon away from the abutting properties and away from the direction of the nearest surface water body, The Suncook River.

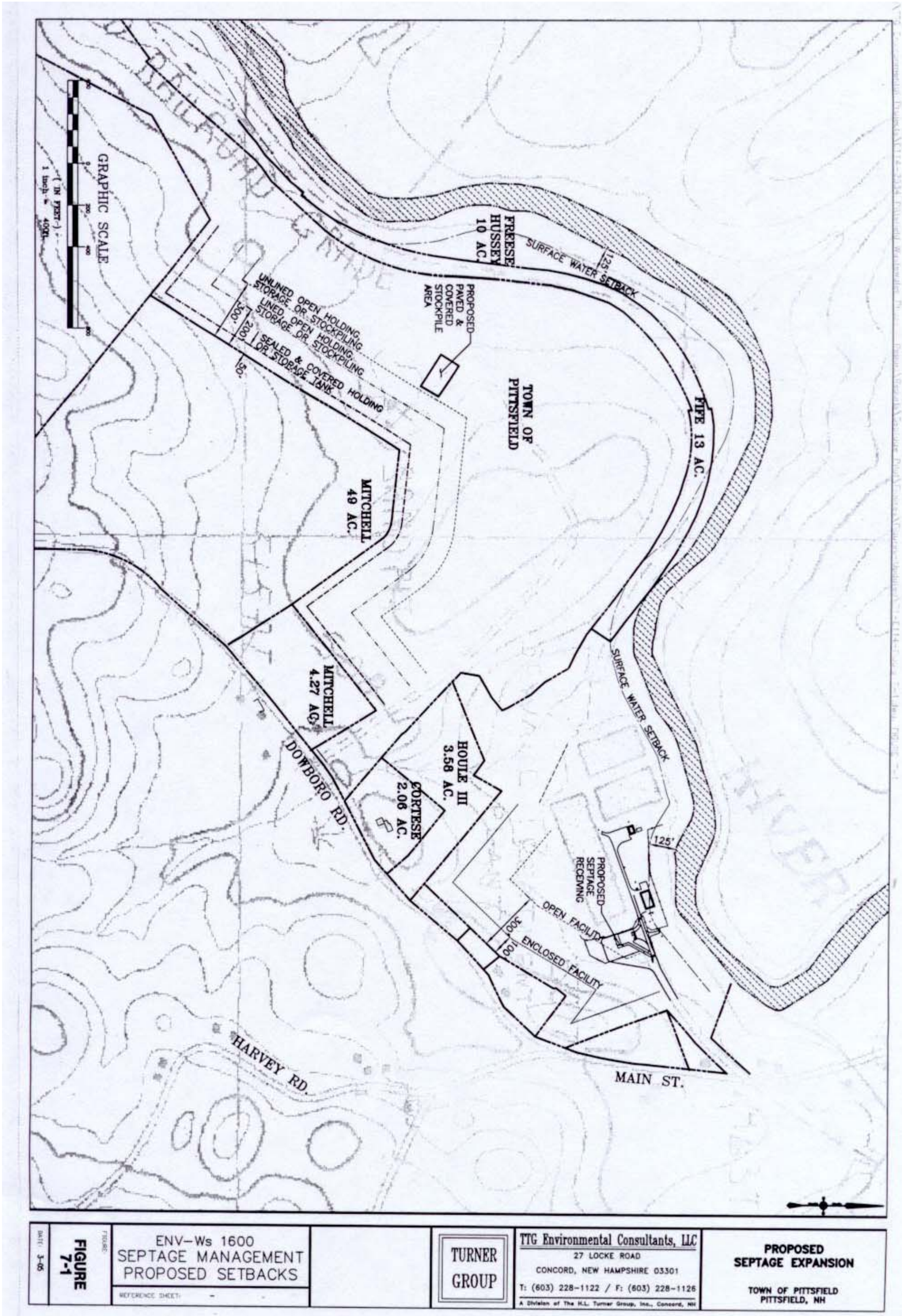
GRAPHIC SCALE
(IN FEET)
1 inch = 400ft.
FREESE HUSSEY 10 AC.
SURFACE WATER SETBACK
125'
PROPOSED PAVED & COVERED STOCKPILE AREA
TOWN OF PITTSFIELD
FIFE 13 AC.
UNLINED OPEN HOLDING, STORAGE OR STOCKPILING
LINED OPEN HOLDING, STORAGE OR STOCKPILING
SEALED & COVERED HOLDING OR STORAGE TANK
500'
200'
50'
MITCHELL 49 AC.
MITCHELL 4.27 AC.
HOULE III 3.58 AC.
CORTESE 2.06 AC.
DOWBORO RD.
SURFACE WATER SETBACK
125'
PROPOSED SEPTAGE RECEIVING
OPEN FACILITY
ENCLOSED FACILITY
300'
100'
HARVEY RD.
MAIN ST.
FIGURE 7-1
DATE: 3-05
ENV-Ws 1600
SEPTAGE MANAGEMENT
PROPOSED SETBACKS
REFERENCE SHEET:
TURNER GROUP
TTG Environmental Consultants, LLC
27 LOCKE ROAD
CONCORD, NEW HAMPSHIRE 03301
T: (603) 228-1122 / F: (603) 228-1126
A Division of The H.L. Turner Group, Inc., Concord, NH
PROPOSED SEPTAGE EXPANSION
TOWN OF PITTSFIELD
PITTSFIELD, NH

Figure 7-1 also indicates the proposed location of the residuals management operation. The old gravel pit site is preferred by Town leadership to house the septage residuals management and storage area due to its significant distance from abutting property owners. Proximity to dwellings is greater than 1000-ft and the 300-ft. setback to abutting property lines can easily be met. The proposed septage residuals management area will consist of a level area sized to accommodate storage of bulking agents, sufficient area for blending and a sufficient area for residuals storage. Stockpiles of blending agents such as short paper fiber, wood ash, leaf/yard waste, sawdust, wood ships, etc. will remain uncovered as will the blending area. The blending area will have an impervious base as will the residuals storage area. A portion of the residuals storage area will be covered for long-term residuals storage. Storm water from the paved areas will be collected in one or more below grade tanks for periodic pumping and treatment at the WPCF.

7.2 Groundwater Discharge Permit

The Town of Pittsfield was directed by the NH DES Underground Injection Control Coordinator to install monitoring wells at the WPCF site and submit a groundwater discharge permit application for the treatment lagoons by June 30, 2005. The Town installed four monitoring wells in April 2005. Two wells were installed at the WPCF site and two wells were installed at the gravel pit site. Five other monitoring wells were installed on the adjoining 90-acre parcel as part of a geotechnical study of the property to ascertain whether groundwater treatment and disposal might be a viable solution for the WPCF effluent discharge.

The Town of Pittsfield submitted one, inclusive groundwater discharge permit application to include the treatment lagoons and the septage residuals management area. The groundwater discharge permit application included references to the planned septage facility expansion, residuals management operations and the concurrent application for a Septage Site and Facility permit from the NH DES Residuals Management Section. The Town anticipates receiving both permits prior to initiating construction for any permanent improvements relating to the septage receiving station and residuals management areas.

7.3 NPDES Permit

The Town of Pittsfield WPCF currently operates under the requirements of a National Pollutant Discharge Elimination System (NPDES) surface water discharge permit. The NPDES permit is a federal discharge permit administered by the United States Environmental Protection Agency (US EPA). Permit requirements include daily, weekly, monthly, quarterly and annual monitoring of a number of parameters that indicate plant performance. The Pittsfield WPCF staff submits monthly reports to the EPA and the NH DES indicating the status of compliance parameters set forth in the NPDES permit. This permit is renewed every five years and regulates the secondary treatment process and effluent discharge to the Suncook River.

With the proposed septage receiving process relying on pre-treated septage filtrate being added to the influent waste stream of the WPCF the Town of Pittsfield must be cognizant of potential changes to future NPDES permits. Some New Hampshire communities discharging into small receiving streams, such as the Suncook River, have seen additional permit requirements for monitoring ammonia, phosphorous, nitrates and metals. Each facility is assessed on a case-by-case basis with the assimilative capacity of the receiving stream, general surface water quality within the watershed and the dilution ratio of stream flow to plant effluent flow playing the most significant roles in adjustments to certain water quality parameters.

The Pittsfield WPCF has a long history of ammonia monitoring with no significant impacts observed to effluent quality or to the receiving stream. As part of the 2003-2004 Pilot Study the importance of phosphorous control was recognized and addressed by implementing chemical addition of ferric chloride to the raw septage as part of the pre-treatment process. The potential for additional nutrient monitoring or metals limits still exists as the NH DES completes their evaluation of the Suncook River watershed. The Pittsfield WPCF is not currently capable of treating for metals such as lead or copper and a specific process may need to be added in the future to achieve and maintain future NPDES surface water quality parameters. Also, if it is determined in the future that the septage filtrate is contributing to an increase in nutrient or metals loadings to the influent waste stream at the WPCF, the Town of Pittsfield could reconsider the groundwater treatment and discharge option for up to 60,000 gallons per day of pre-treated septage filtrate to the land between the WPCF and the former gravel pit site.

8. FUNDING

8.1 Capital Improvements

The Town of Pittsfield has made a significant financial commitment over the past four years to implement needed improvements to the Pittsfield Water Pollution Control Facility. The Town spent more than $300,000 in 2001 to remove sludge from the treatment lagoons followed by another $300,000 in 2002 to construct the "Phase I" headworks improvements, install a floating baffle in the primary lagoon, install a 4000-gallon septage holding tank with mixers and upgrade the influent and effluent flow measurement devices. Since 2002, the Town of Pittsfield has spent almost $75,000 to fund the 2003-2004 Septage Pilot Study. With the exception of the headworks improvements all other costs were borne by the Town from their capital reserve fund for the WPCF.

Over the next two years the Town will construct the "Phase II" secondary process and disinfection improvements as well as upgrades to their WPCF electrical system, improvements to their laboratory and office and upgrades to their main pumping station at Joy Street. These improvements will be funded using the State of NH SRF Loan program for interim funding during construction followed by a combination of USDA Rural Development loan and grant funding to complete the balance of the project. The Town has also received eligibility from the State of NH SAG Grant program to assist in paying off the USDA loan for the Phase I and Phase II improvements.

During the same two years the Town is poised to construct a septage receiving and residuals management facility to complete the current WPCF improvement program. The Town will have to borrow money to pay the full cost of constructing the septage facility expansion perhaps relying on interim construction funding from the State SRF Loan program. The NH DES will make an eligibility determination for the project to receive grant funding from the State SAG program. The proposed septage facility expansion has been deemed ineligible for USDA funding due to its regional service capabilities that extend beyond addressing the immediate and sole needs of the Town of Pittsfield.

8.2 State Aid Grant Eligibility

The NH DES Residuals Management Section has been instrumental in providing regulatory oversight, guidance with interpreting current and proposed septage management rules and public meeting presentations on the grant programs related to WPCF and septage expansion projects. Staff members from NH DES have been involved in the early planning stages of the 2003-2004 Pilot Study and have already used the model developed in Pittsfield to promote public-private partnerships in other communities to expand septage receiving capabilities at other municipal wastewater facilities.

The State Aid Grant (SAG) program was established under NH RSA 486:1,111 to provide financial assistance to New Hampshire communities toward eligible costs related to planning, design and construction of repairs, improvements and upgrades to their wastewater infrastructure. The statute sets minimum criteria to determine grant eligibility. Under this program Pittsfield is eligible for 30% grant funding for eligible wastewater improvement projects. The proposed septage facility expansion meets the minimum criteria to receive SAG funding. Payments under the SAG program are typically made after the completion of the project and determination of final eligible costs.

In addition to funding from the SAG program, House Bill 207 provides for additional grant monies to communities for eligible costs associated with developing new facilities to provide for septage treatment and disposal. In Pittsfield's case the criteria has been met to allow for a maximum grant allocation of up to 50% of the costs for planning, design and construction of the septage expansion project. The Town of Pittsfield will need the SAG and HB207 grant funding to be able to upgrade and expand their septage treatment and disposal capabilities. In March 2005 the Town of Pittsfield sought and received bonding authority from Town residents to borrow up to $1,566,994.00 to design, bid and construct a permanent septage processing facility.

8.3 Potential Revenue Stream

The Town of Pittsfield is prepared to construct a septage receiving facility with the intent that tipping fees collected from the septage haulers will pay down the bond for the capitol improvements, offset the cost of operating and maintaining the facility and possibly generate a positive revenue stream. Two scenarios are presented here to understand the financial impact to the Town and the potential revenue they may realize from owning and operating an expanded septage processing operation. The first revenue scenario presented is the continued public-private partnership, the second revenue scenario is a Town-operated facility.

Table 8-1 presents a potential revenue stream based on the portion of tipping fees collected by the Town assuming they continue with a long-term public-private partnership with SDS or another contract operator. If the town were only to collect $0.025 per gallon they would be able to pay off the bond but not cover their operation and maintenance costs. However, once the permanent infrastructure is in place at the WPCF the Town should not have to cover the cost of "leasing" temporary equipment from SDS and a more equitable arrangement for both parties may be developed. A revenue stream based on septage received at 3.0 million gallons per year and $0.045 per gallon processed is the apparent break-even point for the Pittsfield WPCF to cover the bond and annual O&M costs.

Table 8-1. Potential Revenue Stream for a Public-Private Partnership

Pittsfield WPCF, Pittsfield, New Hampshire (assumes Full-Scale Operation) ***TEC 05***

Revenue Level (at 2.5 MG/yr)	Pittsfield Tipping Fee Revenue ($)	Annual Bond Payment	Annual O&M Cost ($)	Net Revenue ($)
$0.025 / gallon	**$75,000**	**$59,200**	**$71,000**	**-$55,200**
$0.035 / gallon	**$105,000**	**$59,200**	**$71,000**	**-$25,200**
$0.045 / gallon	**$135,000**	**$59,200**	**$71,000**	**$4,800**
$0.055 / gallon	**$165,000**	**$59,200**	**$71,000**	**$34,800**
$0.065 / gallon	**$195,000**	**$59,200**	**$71,000**	**$64,800**

Table 8-2 presents a potential revenue stream based on gallons of septage per year processed by the Town assuming that they take full responsibility for operating the septage processing and residuals management operation. As the volume of septage received increases, the cost of chemicals at the receiving station and the volume of bulking agents at the residuals management site increases as well. Labor costs increase only slightly since a full time person will likely be used to perform some degree of other services at the WPCF not directly related to the septage operation. A revenue stream based on septage received at 1.75 million gallons per year and a minimum tipping fee equivalent to $0.075 per gallon processed is the apparent break-even point for the Pittsfield WPCF to begin accruing positive revenue from the project.

Table 8-2. Potential Revenue Stream - Pittsfield Operators Only

Pittsfield WPCF, Pittsfield, New Hampshire (assumes Full-Scale Operation) ***TEC 05***

Revenue Level (at 3.0 MG/yr)	Pittsfield Tipping Fee Revenue ($)	Annual Bond Payment	Annual Operating Cost ($)	Net Revenue ($)
$0.060 / gallon	$180,000	$59,200	$71,000	$49,800
$0.075 / gallon	$225,000	$59,200	$71,000	$94,800
$0.085 / gallon	$255,000	$59,200	$71,000	$124,800
$0.095 / gallon	$285,000	$59,200	$71,000	$154,800
$0.105 / gallon	$315,000	$59,200	$71,000	$184,800

8.4 Financial Viability Assessment

Based on a design capacity of 3 million gallons of septage processing per year the septage expansion project will generate a positive revenue stream for the Town of Pittsfield. Under the current tipping fee rates and March 2005 cost data the financial break-even point appears to be either $0.045 at 3 MG per year for a public-private partnership or 1.76 MG per year at $0.075 for a facility operated using only town forces. However, several factors can affect the financial viability of this project, many of them beyond the control of the Town of Pittsfield.

In order for the facility to be financially viable, area septage haulers must use the facility extensively each year and in future years as well. The Pittsfield WPCF has adopted a per-gallon rate for septage receiving that is competitive with other municipally owned and operated disposal sites in the region. Based on the septage generation rates compiled by the NH DES Residuals Management Section for Pittsfield and the surrounding 14 towns within the immediate service area there is substantially more septage to be processed than the 3 million gallon per year capacity of the WPCF. Upgrading other communities existing facilities or development of new septage disposal facilities in the region could impact the septage volumes delivered to the Pittsfield WPCF.

Pittsfield's WPCF Superintendent will need to be cognizant of changes in the cost of consumables (chemicals, electricity, make-up water, bulking agents, wood ash, etc.) as these changes will affect the bottom line of the operation. The current wastewater Superintendent does an excellent job of accurately tracking his labor and consumables costs at the WPCF. This attention to detail must continue with future WPCF Superintendent's so that septage tipping fees can be adjusted, if necessary, to reflect the true cost of septage processing and residuals disposal.

The proposed approach for residuals disposal is currently to develop a soil amendment and spread the "manufactured topsoil" on the treatment plant grounds and on the gravel pit site for reclamation of barren soils. Both sites will have monitoring wells and a groundwater discharge permit. This on-site method of septage residuals reuse and disposal will reach its capacity in 2012. During this timeframe the Pittsfield WPCF staff will be monitoring the residuals quality to see that it consistently meets "Class A" or, potentially, "Exceptional Quality" standards for safe disposal and reuse. If the processed residuals consistently meet "EQ" standards the Town may investigate the potential to sell the final product commercially to offset solids handling costs and to potentially generate additional revenue.

9. CONCLUSIONS

The Town of Pittsfield, Gosse Septic Service, the NH DES Residuals Management Section, Resource Management Incorporated and TTG Environmental Consultants collaborated on a two-year Septage Pilot Study at the Pittsfield WPCF aerated lagoon wastewater facility. The overall goals of the Pilot Study were to:

- Collect data on filtrate, plant influent and effluent quality, to determine the effects of septage filtrate on the aerated lagoon treatment process.
- Measure septage solids volumes for a complete septage-hauling season.
- Assess the "pros" and "cons" of operating an expanded septage receiving and septage solids recycling operation from a municipal wastewater lagoon facility.
- Define the limits of operating a financially successful septage receiving and processing station at the Pittsfield WPCF.
- Assess the potential for developing a long-term public-private partnership with a local septage hauler.

Data from the two-year Septage Pilot Study indicate that the Pittsfield WPCF is capable of processing pre-treated septage filtrate through the three-cell aerated lagoon treatment process. Critical to the septage treatment process is adjusting the raw septage pH to 7 or higher, providing reliable raw septage screening and grit removal, using chemical additions for phosphorous control and coagulation of septage solids and providing reliable, reproducible solids dewatering. The Pilot Study process applied ferric chloride for phosphorous control, essentially binding phosphorous to the septage solids. Two years of data on the filtrate indicated that total phosphorous could be held to less than 2ppm on filtrate sent to the aerated lagoons. No negative impacts due to total phosphorous to the lagoon process (traditionally in the form of an algae bloom) or to the final plant effluent (typically high TSS due to algae) were reported throughout the two-year study.

The septage residuals management process consisted of adding wood ash to freshly dumped solids for odor control, blending septage solids with sand and short paper fiber and stockpiling the blended "soil amendment" through a complete winter. "Wet" solids from the dewatering trailer averaged 12% total solids at a generation rate of approximately 1 cubic yard of solids for every 3000 gallons of raw septage processed. Stockpiling through the year caused an apparent 15-20% reduction in stockpile volume. Exposure to summer sunlight and heat as well as repeated freeze-thaw cycles, proven to significantly reduce residuals water content by breaking the bond between the water molecules and solids particles, were thought to be significant volume reducers. Another benefit to the long-term stockpiling was the apparent reduction in bacteria and viruses, which fall prey to sunlight as well as freezing. The final soil amendment product was tested and met "Class A" standards for residuals reuse and disposal. Consistent residuals quality could lead to an added revenue stream for the Town if they are able to develop a soil amendment product for sale/reuse.

The “pros” and “cons” associated with developing a permanent, expanded septage facility at the Pittsfield WPCF can be summarized in terms of cost, regulatory compliance and sustainability. To offset the capital cost of the septage expansion the NH DES Residuals Management Section has indicated that Pittsfield is eligible for HB207 funding having already signed agreements to take septage from five towns in the service area. Depending on the equipment and building type selected, the constructed cost of the project could be significant. The Town will have to rely on a steady stream of septage haulers using Pittsfield’s receiving station to pay back their share of the bond and to offset operating costs. Regulatory compliance was achieved for two straight years using temporary equipment and different personnel to operate the septage receiving station. Continued regulatory compliance will be a function of the ease of operating the permanent equipment, attention to the process, and future changes to the NPDES permit. Sustainability of the process to operate in a cost effective manner for 20 or more years is partly a function of the initial capital cost, the regulatory climate, as it changes over the next twenty years, and the ability of the WPCF Superintendent to monitor the operating costs and adjust the tipping fees accordingly to remain cost-effective and competitive.

The public-private partnership developed at the Pittsfield WPCF proved to be a win-win proposition for the Town and for the prime septage hauler, Gosse Septic Service (GSS) of Barnstead, New Hampshire. The Town benefited by having GSS provided nearly all of the temporary equipment and manpower needed to run the pilot process. GSS benefited by forgoing tipping fees in return for the materials and labor supplied by GSS. Both parties learned a tremendous amount about what it takes to produce consistent results from the septage screening, chemical addition and dewatering operations to minimize the organic loading to the WPCF lagoon process. Based on the mutual success of the two-year pilot study the Town and GSS, now operating as Septic Disposal Solutions (SDS), could enter into a future agreement to have SDS operate and manage the permanent septage receiving station.

The NH DES Residuals Management Section has played a key role in the Pilot Study and will continue to be a valuable resource to the Town of Pittsfield. The Town of Pittsfield is poised to go forward with the design and construction of a permanent septage receiving station and septage residuals management program pending approval from the NH DES Wastewater Engineering Design Review Section.

Appendix 1
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Report on the 2003/2004 Pittsfield Septage Pilot Study
Town of Pittsfield, New Hampshire

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